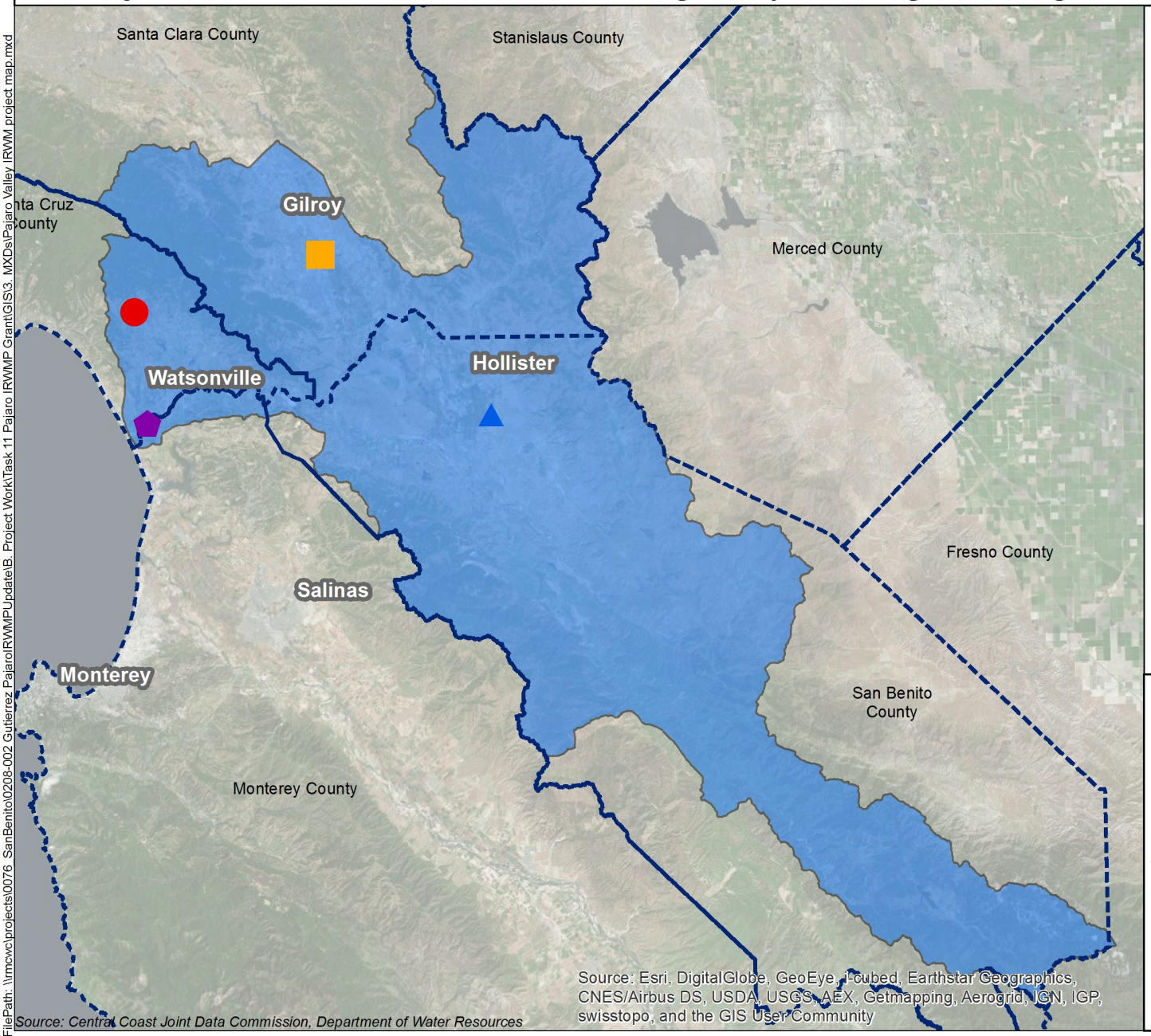
ATTACHMENT 3: PROJECT JUSTIFICATION

2014 IRWM Drought Solicitation Project Summary Table

Drought Project Element		P1. Delivered Water Enhancement and Drought Response Irrigation	P2. South County Recycled Water Improvements	P3. Expanded Recycled Water Use Project	P4. Corralitos Creek Water Supply and Fisheries Enhancement
D.1	Provide immediate regional drought preparedness	X	X	X	
D.2	Increase local water supply reliability and the delivery of safe drinking water				X
D.3	Assist water suppliers and regions to implement conservation programs and measures that are not locally cost-effective				
D.4	Reduce water quality conflicts or ecosystem conflicts created by the drought				X
IRWM Project Element					
IR.1	Water supply reliability, water conservation, and water use efficiency	X	X	X	X
IR.2	Stormwater capture, storage, clean-up, treatment, and management				X
IR.3	Removal of invasive non-native species, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands				
IR.4	Non-point source pollution reduction, management, and monitoring	X			
IR.5	Groundwater recharge and management projects				
IR.6	Contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users	X	X	X	
IR.7	Water banking, exchange, reclamation, and improvement of water quality	X			
IR.8	Planning and implementation of multipurpose flood management programs				
IR.9	Watershed protection and management				
IR.10	Drinking water treatment and distribution				X
IR.11	Ecosystem and fisheries restoration and protection				X

Pajaro River Watershed Emergency Drought Program Regional Map



N

0 10 20

Miles

Legend

- Corralitos Creek Water Supply and Fisheries Enhancement
- South County Recycled Water Improvements
- Expanded Recycled Water Use Project
- Delivered Water Enhancement and Drought Response Irrigation Program
- County Boundary
- Pajaro Watershed

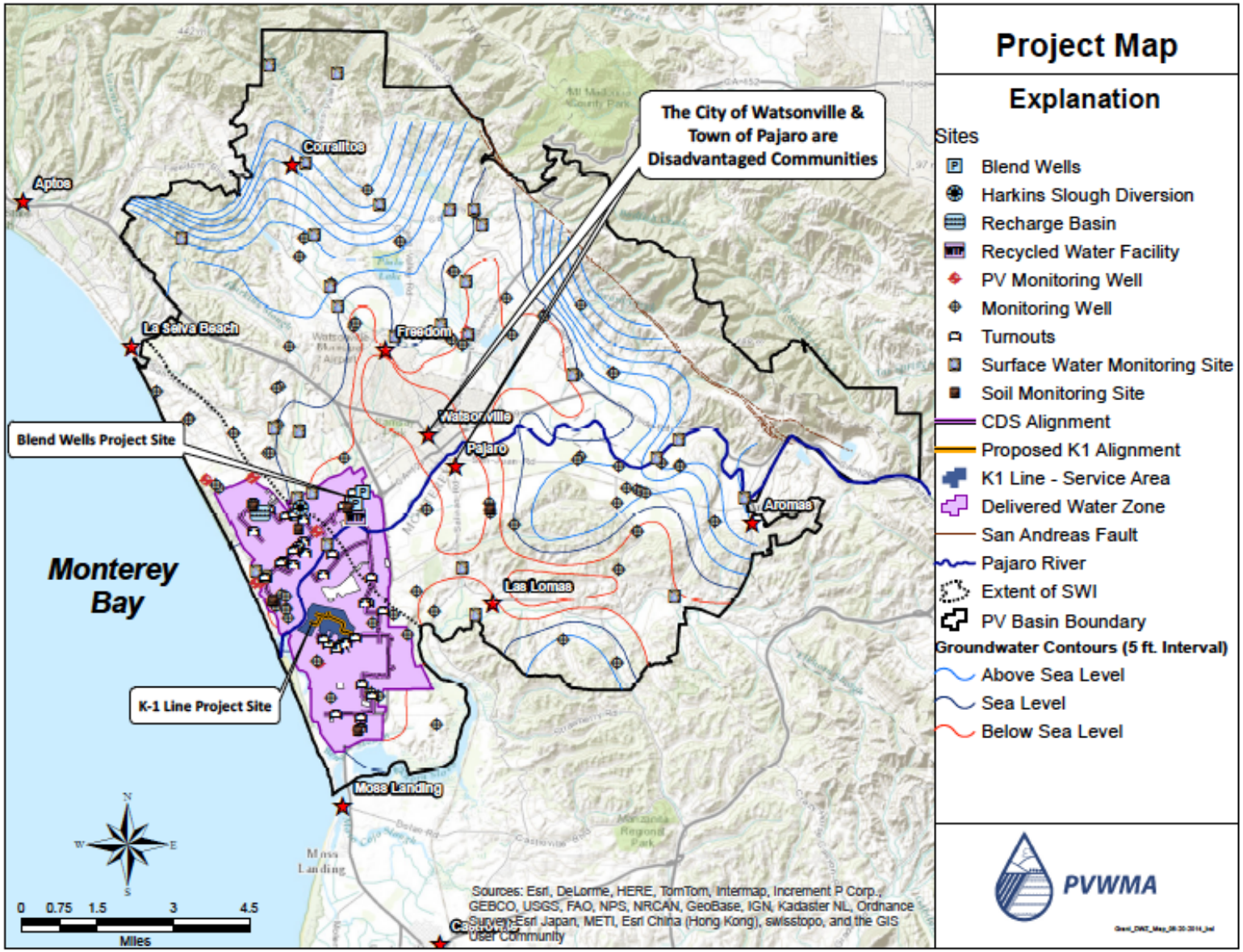
PAJARO RIVER watershed
Integrated Regional Water Management

Source: Central Coast Joint Data Commission, Department of Water Resources

FilePath: \\rmcwc\projects\0076 SanBenito\0208-002 Gutierrez PajaroIRWMPUpdate\B. Project Work\Task 11 Pajaro IRWMP Grant\GIS\3. MXDs\Pajaro Valley IRWM project map.mxd

Project No. 1 Delivered Water Enhancement and Drought Response Irrigation Program

Project Description: A recycled water supply enhancement project combined with improved irrigation efficiency will reduce groundwater pumping and seawater intrusion and will preserve drinking water supply.



Project Discussion: Delivered Water Enhancement and Drought Response Irrigation Program

Eligible Drought Project Type: Provide immediate regional drought preparedness (1 page maximum)

Project Need: Drought conditions are increasing the stresses on the already over-taxed Pajaro Valley Groundwater Basin. Groundwater levels at and below sea-level have induced seawater intrusion in the Pajaro Valley, a condition which is exacerbated by the current drought, further threatening the quality of groundwater. Using a model developed by the USGS and the Pajaro Valley Water Management Agency (PVWMA or "Agency"), it has been determined that one of the most efficient ways to stop seawater intrusion is to reduce pumping at the coast in order to create a hydrostatic barrier. To meet this critical need, the Agency proposes the "Delivered Water Enhancement and Drought Response Irrigation Program." The program will increase the use and improve the quality of delivered, supplemental water supplies for agricultural irrigation, increase water use efficiency, and slow seawater intrusion. This project aims to reduce pumping of the Pajaro Valley Groundwater Basin by 750 acre feet per year (AFY), providing the Pajaro Valley with immediate drought relief. The project will meet these goals by:

- Plumbing blend wells into the Coastal Distribution System (CDS) to ensure higher quality water and to replace groundwater extractions from the overdrafted aquifer in the delivered water zone (DWZ),
- Constructing an additional 8,350 linear feet of distribution pipelines, known as the K-1 line, of the CDS to provide additional delivery of recycled water, and
- Implementing a Drought Response Irrigation Program (DRIP) to provide technical support for growers to increase efficiency of delivered water use and to reduce groundwater pumping.

Alleviating drought impacts and increasing drought preparedness: Through the CDS, the Agency delivers a combination of recycled water and blend water to the area of the valley most impacted by seawater intrusion. This project alleviates drought impacts by reducing coastal groundwater pumping in exchange for a reliable supply of high quality, supplemental irrigation water while protecting agriculture, the valley's primary land use. By constructing the K-1 line of the CDS, the Agency will be able to provide water to an additional 310 acres, an area that uses 750 AFY on average. Plumbing the blend wells into the CDS will improve delivered water quality, which will increase customer demand and help staff to optimize the production of recycled water. The DRIP program will ensure that the supplemental water will be used efficiently and will further reduce groundwater pumping by providing irrigation efficiency assistance for growers and irrigators. A rigorous monitoring program will measure progress toward the estimated water supply and water quality benefits at the scale of the individual grower, the DWZ, and the basin. Overall, the project increases local water supply reliability while helping to protect the groundwater resource from seawater intrusion.

Benefits to drinking water supply: The project benefits the drinking water supply for the City of Watsonville, a disadvantaged community. By plumbing the blend wells into the CDS mainline, the water these wells produce will be efficiently blended with recycled water. This project will replace the current practice of drawing approximately 800 AFY of blend water directly from the City of Watsonville's potable water supply, which is currently strained due to both drought and water quality concerns (Chromium-6 in particular).

Water quality and ecosystem benefits: The project increases the consistent supply of high quality delivered water in the DWZ, which will incentivize more growers to convert from groundwater pumping to using the delivered water. Reduced pumping protects groundwater quality by slowing the rate of seawater intrusion into coastal aquifers. The project will deliver suitable irrigation water to an additional 310 acres of cropland currently limited to poor quality groundwater. Improved irrigation efficiency will further protect groundwater quality by keeping both water and nutrients in the root zone where more fertilizer can be consumed by the plants instead of leaching into groundwater. This project will also address ecosystem conflicts, protecting nearby surface waters and important wetland habitat by minimizing surface runoff of ag-related pollutants.

Need for expedited funding: Expedited funding is needed to construct the project and implement the DRIP program as quickly as possible. The engineering design drawings are currently 90% complete for the K-1 line, and the blend well piping project will have biddable specs and drawings by February 1, 2015. This grant will fund three quarters of the project costs, making it possible for the Agency to construct the project to provide immediate drought preparedness for the Pajaro Valley.

Project Physical Benefits: Delivered Water Enhancement and Drought Response Irrigation Program

The Primary Physical Benefit of the project is the delivery of 750 AFY of recycled water to an area within the DWZ not currently served by the CDS. The Secondary Physical Benefit of the project is the improved water quality of the delivered water, as compared to the available groundwater, as demonstrated by the reduced chloride concentrations of up to 400 mg/L. The annual physical benefits are presented in the tables below and documented in the following sections.

Annual Project Physical Benefits – Primary Benefits
Project Name: Delivered Water Enhancement & Drought Response Irrigation Program (DRIP)
Primary Type of Benefit Claimed: Water Supply
Units of the Benefit Claimed : 750 acre-feet per year water supply
Additional Information About this Benefit: increased water deliveries equates to decreased groundwater pumping

(a)	(b)	(c)	(d)
	Primary Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2014	0	0	0
2015	0	0	0
2016-2046	0	750	750

Comments: The numbers represent total water deliveries in acre-feet per year (AFY). The project increases water deliveries by 750 AFY, which equates to a 750 AFY reduction in groundwater pumping. This assumes the project is constructed in 2015 and fully operational by 2016 and has a lifespan of 30 years.

Annual Project Physical Benefits - Secondary Benefits
Project Name: Delivered Water Enhancement & Drought Response Irrigation Program (DRIP)
Secondary Type of Benefit Claimed: Improved Water Quality
Units of the Benefit Claimed : chloride concentration in delivered water compared to groundwater in parts per million (ppm)
Additional Information About this Benefit_____

(a)	(b)	(c)	(d)
	Secondary Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2014	500ppm	100ppm	400ppm
2015	500ppm	100ppm	400ppm
2016 - 2046	500ppm	100ppm	400ppm

Comments: Column (d) shows the improvement in chloride concentration of delivered water compared to that of groundwater currently being used. This assumes the project is constructed in 2015 and fully operational by 2016 and has a lifespan of 30 years.

Background and Technical Basis for the Project: Seawater intrusion was first documented in the Pajaro Valley in 1953 (State Water Resources Board, 1953), and remains a persistent and significant threat. The PVWMA is a groundwater management agency that was established to efficiently and economically manage

existing and supplemental water supplies in order to prevent further increase in, and to accomplish continuing reduction of, long-term overdraft and to provide and ensure sufficient water supplies for present and anticipated needs within its boundaries.

Long-term overdraft conditions have caused groundwater levels to fall below sea level in places throughout the valley all year long (Figure 1). As shown in Figure 2, the combination of long-term overdraft and continued groundwater extractions has caused seawater to migrate up to three miles inland, contaminating numerous groundwater extraction facilities within the basin and threatening the productivity of prime agricultural land.

Since its formation in 1984, the PVWMA has taken many steps together with the community to address the aquifer overdraft. With broad stakeholder involvement, the PVWMA developed several Groundwater Management Plans commonly referred to as Basin Management Plans (BMP) which identify projects necessary for balancing the basin and stopping seawater intrusion. Using a model developed by the USGS and PVWMA to guide and inform the BMP process, it has been determined that one of the most efficient ways to stop seawater intrusion is to reduce pumping at the coast in order to create a hydrostatic barrier.

To achieve the BMP goal of reducing pumping along the coast, PVWMA constructed the CDS (shown in Figure 2) between 2002 and 2007 to serve some of the most impacted areas in the valley. Through the CDS, supplemental water supplies are delivered for agricultural irrigation purposes, to be used in lieu of groundwater. This can be considered “In-Lieu Recharge.” Recycled water was identified in the BMPs as the the primary supplemental water to be supplied through the CDS. In 2009, PVWMA, in partnership with the City of Watsonville, constructed the Recycled Water Treatment Facility to supply the CDS and serve agricultural irrigation users in the coastal area. Recycled water provides the valley with a local, reliable, safe and drought-tolerant irrigation supply that reduces the demand for groundwater production in the area most impacted by seawater intrusion.

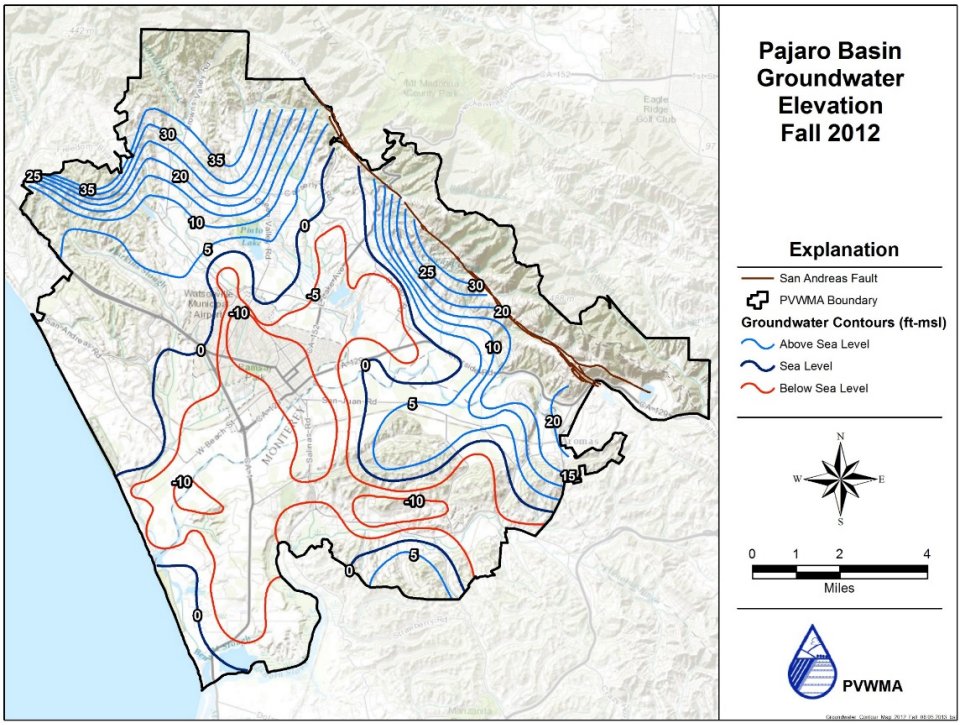


Figure 1. Groundwater surface elevation map, Fall 2012

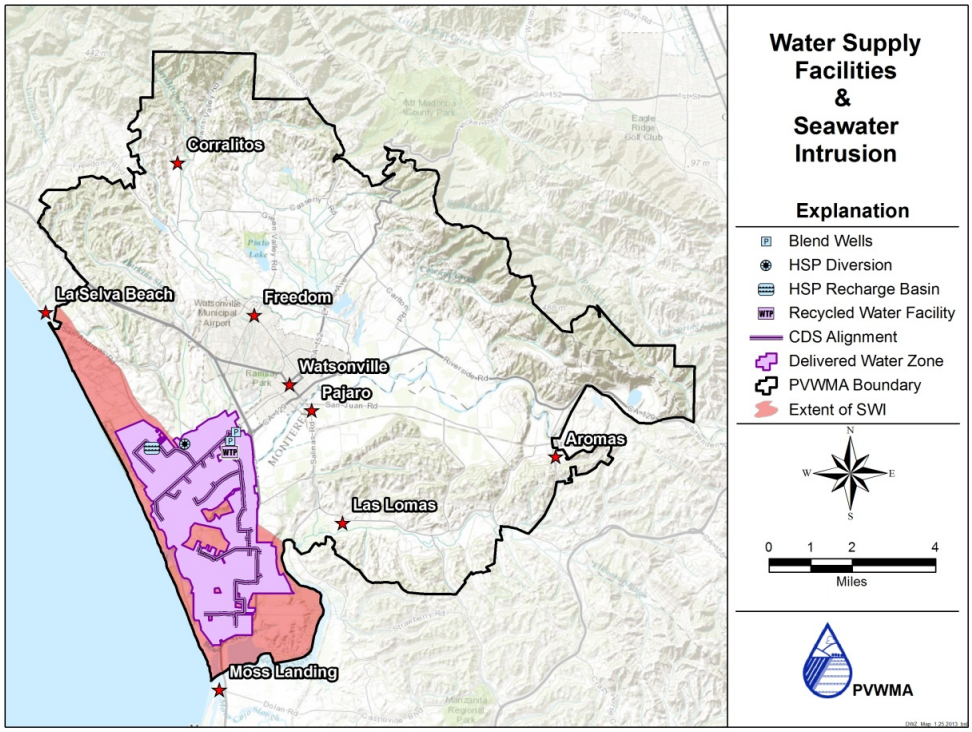


Figure 2. Seawater Intrusion and Delivered Water Zone (Service Area)

Prior to delivery, recycled water is blended with supplemental supplies to reduce the concentration of salts as shown in Figure 3.

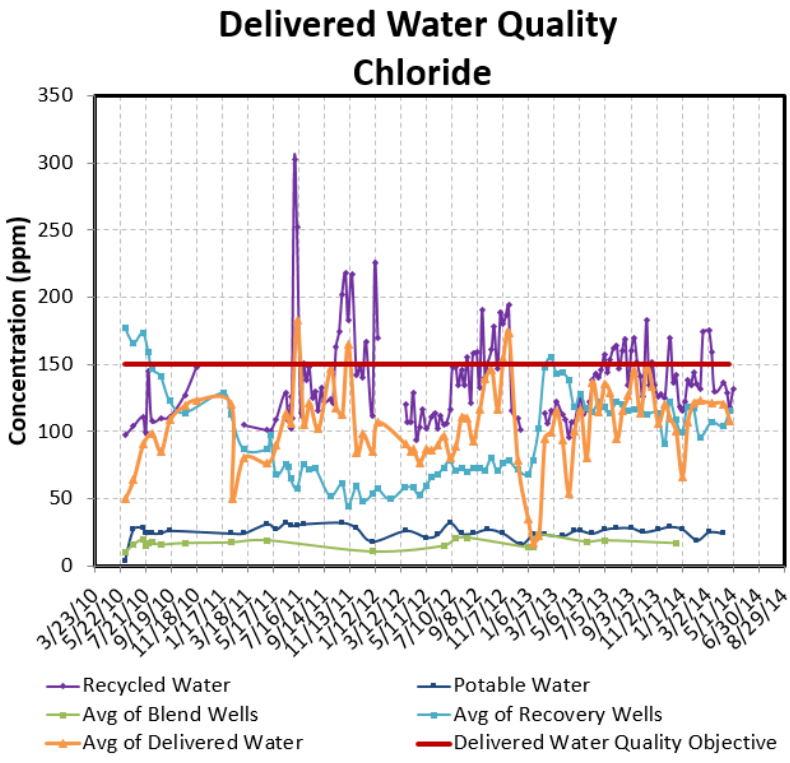


Figure 3. Source and Delivered Water Quality

In 2013, agency operators delivered over 4,424 acre-feet of supplemental irrigation supply, 2,992 acre-feet of recycled water plus 1,432 acre-feet of blend water. The largest contribution of blend water came from the 785 acre-feet provided by the City of Watsonville's potable water supply system (Figure 4). The treatment facility has the capacity to supply 4,000 acre-feet of recycled water during the irrigation season if the demand and distribution service area can be expanded to receive the additional supplies. Thus, the opportunity exists to increase deliveries to the coastal service area through an expanded distribution system and increased deliveries to existing users.

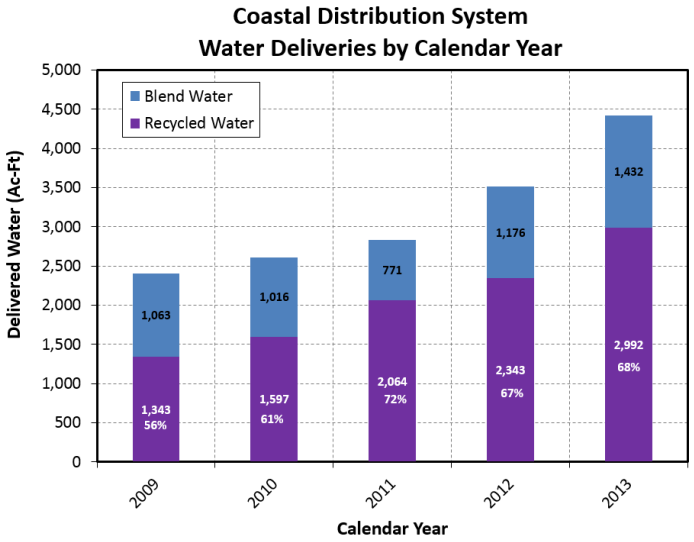


Figure 4. Delivered Water Composition and Volume by Year

Even with these facilities, seawater intrusion continues to contaminate the Pajaro Valley's primary source of water and is threatening the $850 million agricultural economy at a rate of approximately 1,900 acre-feet per year (PVWMA, 2014). Drought conditions have intensified the magnitude of these problems by significantly reducing recharge while creating a need for greater groundwater production.

Additionally, the City's supply of potable water for blending will be cut off due to the City's need to provide adequate potable water to its residents. The City of Watsonville provides water and sewer services to over 55,000 people within the Pajaro Valley. The City's average annual water demand of 7,400 acre-feet is met through a combination of groundwater production (90%) and surface water diversions (10%). Groundwater extraction facilities are threatened by elevated concentrations of nitrate and new Chromium-6 regulations. Drought conditions in 2013 resulted in a surface water take that was only 40% of average. These conditions forced the City to limit PVWMA use of the potable wells as a blend supply for the recycled water.

In response to these drought conditions, the PVWMA developed the Delivered Water Enhancement and Drought Response Irrigation Program This project aims to fully utilize available recycled water supplies, replace the blend supply to meet water quality needs, utilize available supplies more efficiently and reduce pumping of the Pajaro Valley Groundwater Basin. The project will meet these goals by:

- Plumbing blend wells into the Coastal Distribution System (CDS) to ensure higher quality water and to replace groundwater extractions from the overdrafted aquifer in the delivered water zone (DWZ),
- Constructing an additional 8,350 linear feet of distribution pipelines, known as the K-1 line, of the CDS to provide additional delivery of recycled water, and
- Implementing a Drought Response Irrigation Program (DRIP) to provide technical support for growers to increase efficiency of delivered water use and to reduce groundwater pumping.

Estimates of without project conditions: Without the project, available recycled water supplies would go underutilized, delivered water quality will decrease due to the loss of the City's blend well supply, the area in the coastal zone proposed to be served by the project would continue to irrigate with lower quality groundwater, and groundwater overdraft and seawater intrusion continues and is potentially increased if the drought continues into 2015.

Water supply benefits: The Delivered Water Enhancement project will provide 750 AFY. The K-1 line would provide delivered water service to 310 acres of land that is not presently connected to the CDS and is dependent upon groundwater (Figure 5). As shown in the figure, the purple areas are currently using delivered water. The areas shown in blue have the ability to use delivered water (i.e., the infrastructure is in place), but they are not using it. The area shown in dark blue is the area that would be served by the K-1 line, where average water demand is 750 AFY (Figure 6). The current water demand within the entire DWZ is approximately 10,600 AFY (Figure 6 – Table).

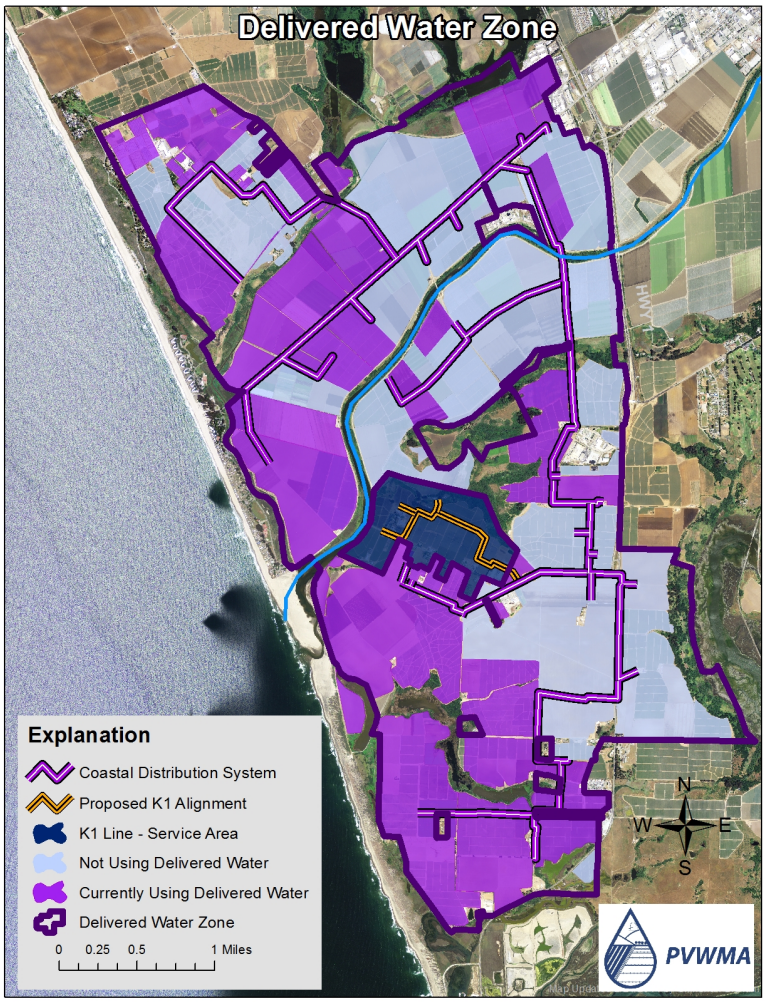


Figure 5. New K1 Service Area within Delivered Water Zone

It is likely that the cummulative impact of the delivered water enhancement project will exceed the 750 AFY being claimed. The areas shown in light blue in Figure 5 are presently able to receive delivered water service but do not take it. The Agency currently has the additional supply that could be used to offset the groundwater production in this area and is presently conducting an outreach effort to gain additional customers in this area. The DRIP program element of the project will expand and enhance this effort. While not included in the 750 AFY water supply benefit estimate, the impact of gaining additional delivered water users could result in an actual water supply benefit of about 1,000 AFY given the demands in the area.

Calendar Year	2006	2007	2008	2009	2010	Average: 2006 - 2010
Precipitation (inches)	28.24	12.52	16.29	19.82	30.04	**21.38**
A. Sum of Wells in DWZ (~96 Wells, AF)	7,976	8,974	9,614	7,278	6,293	**8,027**
B. Sum of Excluded Wells in DWZ (~22 Wells, AF)	616	836	831	870	592	**749**
C. Sum of Delivered Water (AF)	998	1,336	1,693	2,402	2,668	**1,819**
E. Sum of all PVWMA Metered Wells (848 wells in 2010, AF)	41,631	47,296	49,966	43,615	37,621	**44,026**
DWZ - Metered Groundwater Production (A+B)	8,593	9,809	10,446	8,148	6,885	**8,776**
DWZ - Metered Production (Groundwater + Delivered Water; A+B+C)	9,591	11,146	12,138	10,550	9,554	**10,596**

Note: Exlcuded from this analysis are unmetered & municipal wells.

12/21/2011 - bsl

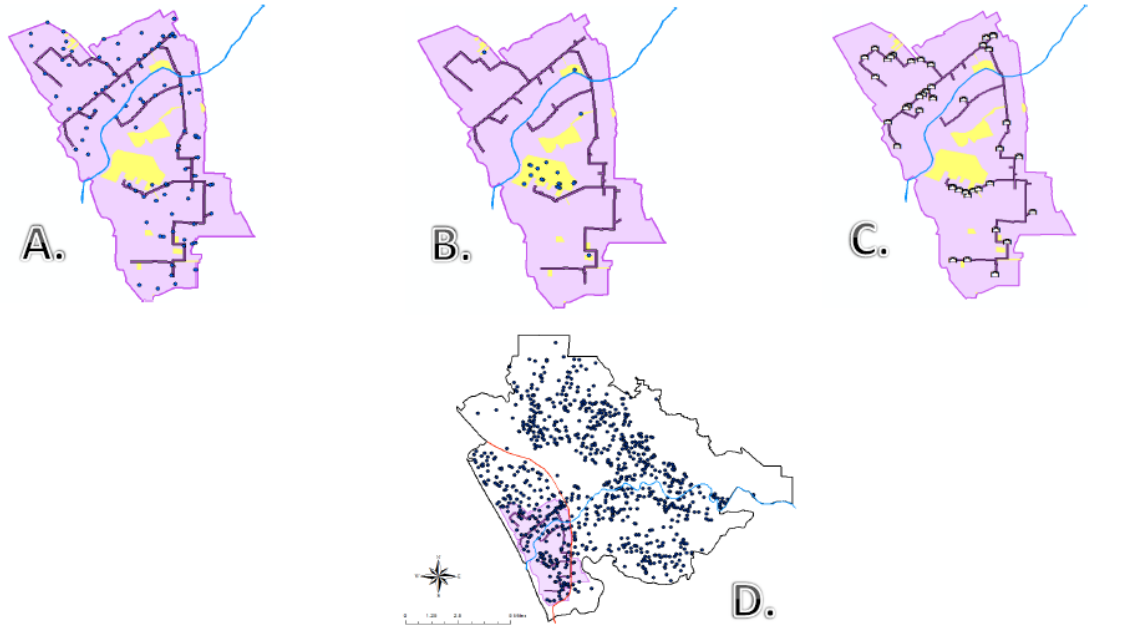


Figure 6. Water Demand

Additionally, the proposed delivered water enhancement project will reduce the strain on the City of Watsonville's potable water supply. The Agency uses approximately 800 acre-feet per year of potable water to blend with recycled water and serve as irrigation supply. Plumbing the Blend Wells into the CDS near the Recycled Water Facility will provide a source of high quality blend supply, relieving pressure on the City's system by reducing the need for the City's water.

Monitoring the 750 AFY water supply benefit. The project's 750 AFY supply and associated reduction in groundwater pumping will be measured through water use data collected by the PVWMA. The PVWMA operates meters for agricultural wells and delivered water turnouts, and manintains an extensive monitoring program within the DWZ (Figure 7). Improvements in water use efficiency for growers participating in the DRIP program will be measured through a combination of on-farm performance monitoring (including recordkeeping of irrigation schedules and flow meter readings) and participant surveys.

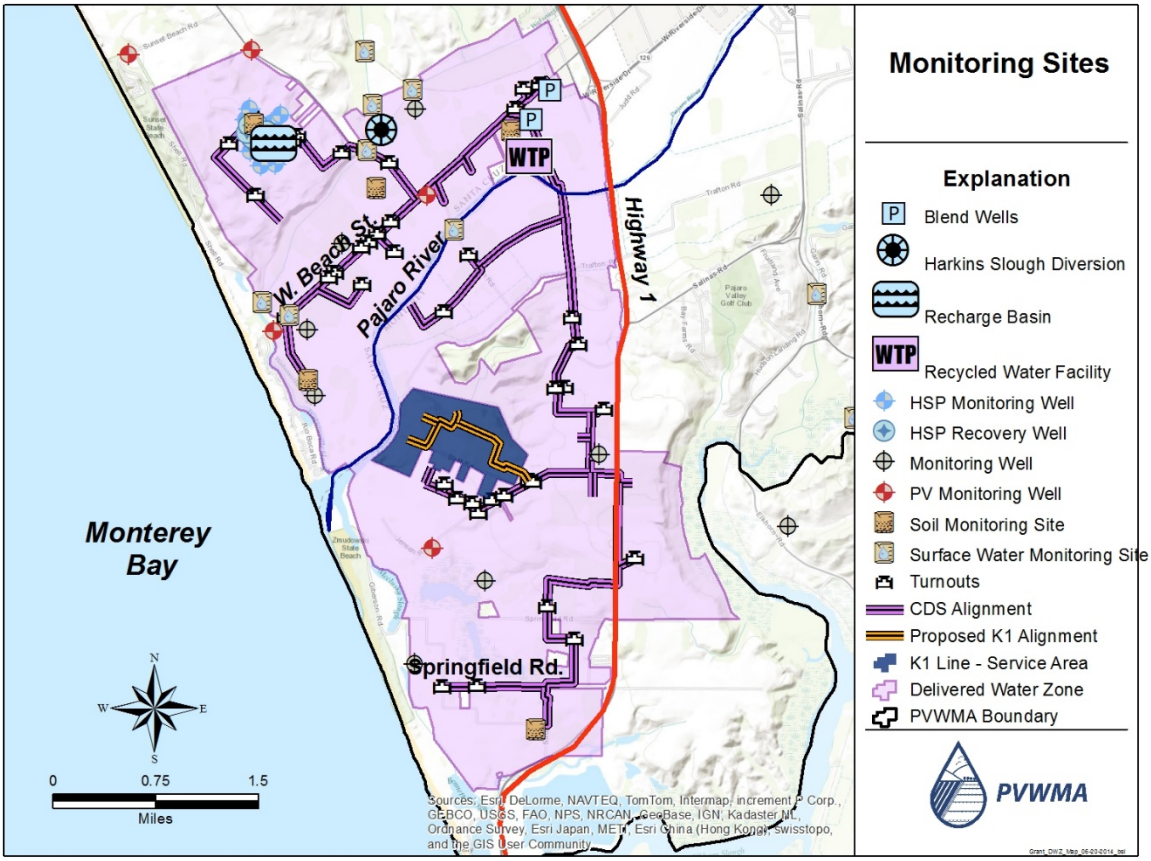


Figure 7. Monitoring Sites

Water quality benefit: The proposed project will reduce chloride concentrations in irrigation water in the K-1 line service area by up to 400mg/L (from over 500 mg/L to 102 mg/L). Seawater intrusion has caused elevated chloride concentrations in groundwater, sometimes to the point that the water is not usable for the purpose of growing crops. In many cases, delivered water is of significantly better quality than groundwater. The average chloride concentration in delivered water is 102 mg/L, as shown by the orange line on Figure 3. The chloride concentrations in groundwater based on a ten-year period from 2002 through 2011 are shown in Figure 8. Roughly half of the DWZ has groundwater chloride concentrations in excess of 250 mg/L, and a subsection of that has chloride over 500 mg/L, sometimes as high as 13,000 mg/L. Much of the area served by the proposed delivered water enhancement project K1 line has chloride concentrations above 500mg/L.

Monitoring water quality benefits: A rigorous monitoring program currently managed by the PVWMA will measure and track the water quality benefits of delivered water and will also monitor groundwater quality. Included in the monitoring program are weekly to monthly water quality samples of the supplemental source water, samples of the blended, delivered water from active turnouts, and quarterly to semi-annual groundwater samples. Soil samples are also collected three times each year. The purpose of this extensive monitoring program is to track the quality of delivered water and its effects on groundwater and soils. Figure 9 shows soil chloride trends at two sites, illustrating significant improvement in soil salinity following several years of irrigating with supplemental water supplies.

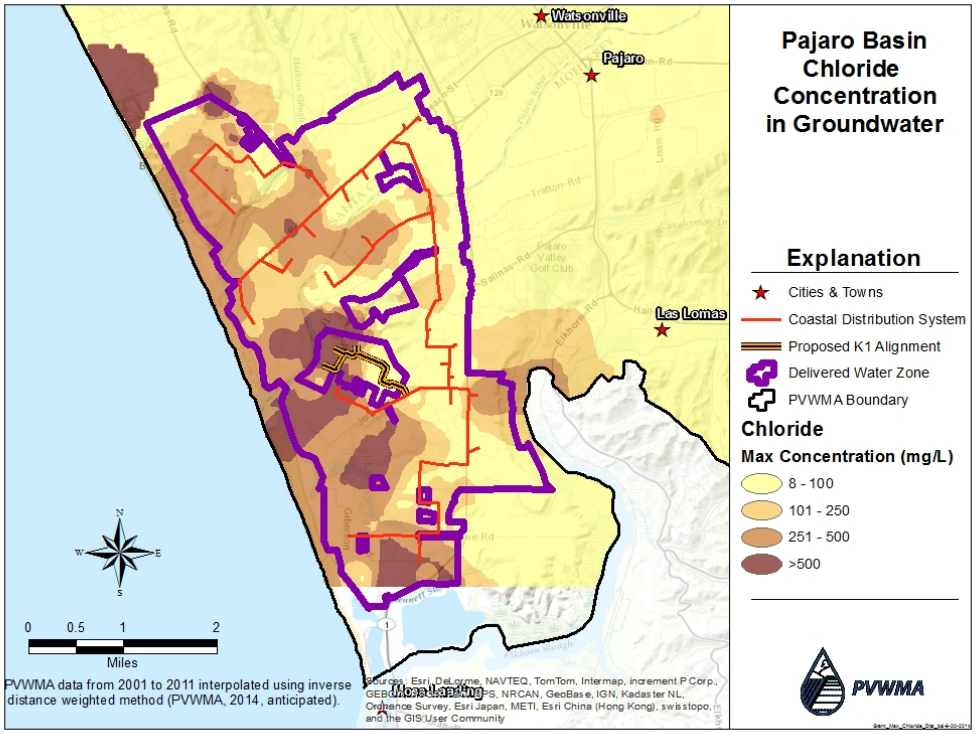


Figure 8. Groundwater Chloride Concentration

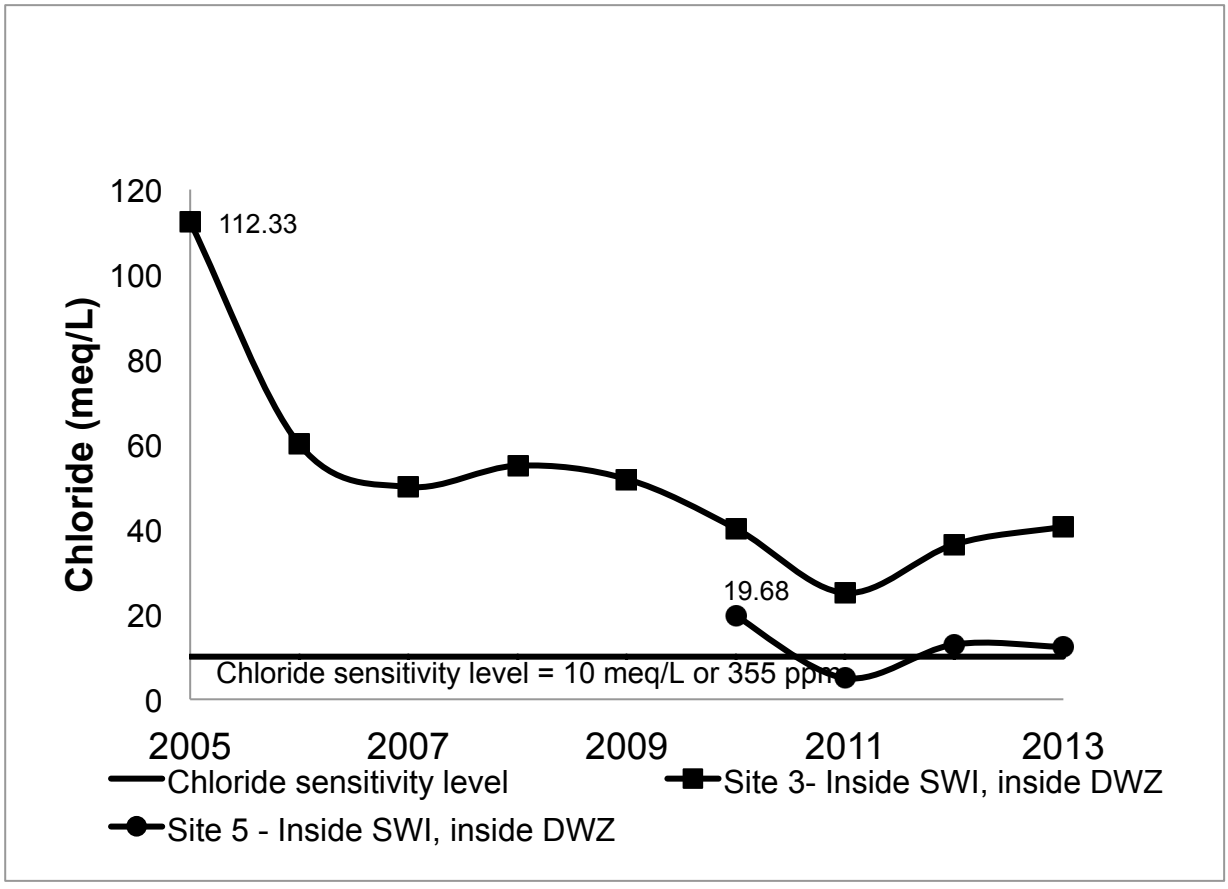


Figure 10. Soil Chloride Trends

Project team: PVWMA will manage the Delivered Water Enhancement and Drought Response Irrigation Program. Staff has been successful in planning, constructing and operating several large-scale water supply facilities, on time and under budget. The staff has a strong track record of overseeing project implementation and completing hydrologic modeling activities to verify efficacy of existing and proposed water supply facilities. PVWMA will partner with the Central Coast Ag Water Quality Coalition and the Resource Conservation District of Santa Cruz County, Dr. Michael Cahn with UC Cooperative Extension, and the Natural Resources Conservation Service (NRCS) to implement the collaborative DRIP program. The partners have a proven record of success bringing their respective strengths in technical assistance and outreach together in collaborative projects to improve agricultural water use efficiency in the Pajaro Watershed.

Facilities, policies, and actions required to obtain the physical benefits: The distribution project was included in the 2002 BMP and BMP EIR and approved by the PVWMA Board of Directors. The facilities required to obtain the physical benefits of the distribution project include the K-1 distribution pipeline, and pipeline/plumbing to connecting wells. Additonally, PVWMA will secure water use agreements with agricultural irrigators in the service area to establish the terms and requirements for use of the delivered water.

An irrigation efficieny program using the DRIP program model was included in the Conservation Chapter of the recently adopted BMP and BMP EIR (April 2014), and accounts for 40% of the groundwater overdraft solutions described in the BMP. The program includes education, outreach, and technical and financial assistance. The actions required to obtain the physical benefits include the following:

1) Outreach to increase the number of delivered water customers and to recruit grower participation in the DRIP program by raising awareness of the benefits of using the supplemental water supply and of employing best irrigation efficiency practices,
2) Performing irrigation system efficiency evaluations and providing growers with education about how to improve their system's performance,
3) Providing cost-share and technical assistance to implement projects that will improve irrigation system performance and will result in water supply and water quality benefits, and
4) Providing cost-share, technical assistance and training to help growers access and utilize irrigation scheduling practices and technology and to adopt new irrigation practices to provide a long-term water supply benefit.

Equipment required for the program will include irrigation system infrastructure (e.g., pipes, nozzles, drip lines) and metering equipment such as soil moisture meters and flow meters. There are no permitting requirements associated with this component of the project. Performance monitoring of water use will document physical benefits resulting from the DRIP.

Potential adverse physical effects: There will only be temporary adverse physical effects during construction of the proposed project. However, these impacts were all considered less than significant in the EIR.

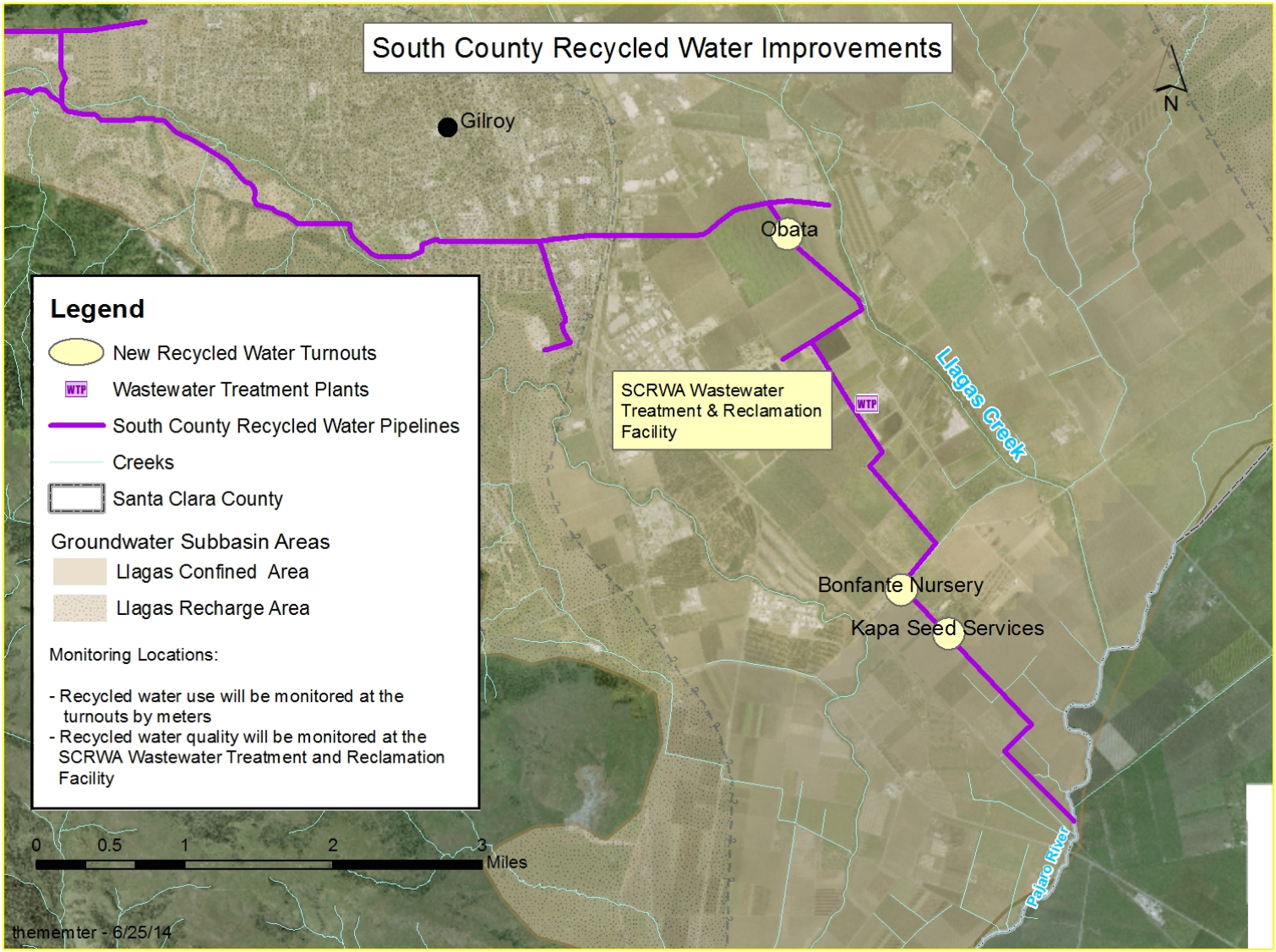
Cost Effective Analysis

There are three elements to the project, construction of the K-1 distribution pipeline, connection to two supplemental wells, and implementation of the DRIP water use efficiency program. There is no alternative to the K-1 distribution pipeline, construction of the pipeline is the only option for delivering blended recycled water to the area not currently served. The alternative to the existing well connections is the installation of new wells and connection to the new wells. The alternative to the implementation of the DRIP water use efficiency program is not implementing any outreach and technical assistance to the irrigators. Given the fact that only the well connections have an alternative, the information presented below includes an analysis of that alternative only.

Project Analysis **Project Name: Delivered Water Enhancement and Drought Response Irrigation Program**	
Question 1	Types of benefits provided as shown in Table 5 • Water supply • Water quality
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes, for connection to the existing well
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. Alternative 1: installation of two new wells and connecting pipelines = $1,200,000
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. The proposed connection to existing wells is the least cost alternative
Comments:	

Project No. 2 South County Recycled Water Improvements

Project Description: This project will install three recycled water turnouts in the Gilroy area to deliver 520 AFY of higher quality water for irrigation and construction.



Project Discussion: South County Recycled Water Improvements (SCVWD) (1 page maximum)
Eligible Drought Project Type: Provide immediate regional drought preparedness

Project Need: Southern Santa Clara County overlies the Llagas Groundwater Subbasin. Groundwater supplies are maintained through natural groundwater recharge, managed aquifer recharge with local and imported water supplies, and in-lieu recharge from deliveries of surface water supplies for irrigation demands and recycled water use. Because SCVWD has a zero percent allocation for agriculture and a 50 percent allocation for M&I from the CVP this year, all releases of imported water to creeks and ponds for groundwater recharge were discontinued at the end of January 2014, with the exception of releases to Madrone Channel and upper Coyote Creek to help meet the City of Morgan Hill's immediate water supply needs. Year to date recharge in the subbasin is 39% of the five-year average and groundwater levels are 30 feet lower than the five-year average. If water supply conditions deteriorate further in 2014 or drought conditions continue into 2015, groundwater recharge will be further reduced.

Agricultural pumping accounts for about half the pumping in the Llagas Subbasin and thus, agricultural water users are at risk due to declining groundwater levels. Additionally, agricultural wells are typically shallower than municipal wells and are greater risk going dry. Compounding the groundwater problem, SCVWD is in the process of discontinuing deliveries to 72 water users that have SCVWD permits for delivery of untreated surface water from raw water pipelines, which includes some agricultural customers. The District is delivering 80 percent of 2013 use. Given these drought conditions and significant impact on agricultural users, an alternative recycled water supply is needed to provide immediate drought relief.

Alleviating drought impacts and increasing drought preparedness: The South County Recycled Water system is a partnership between SCVWD, South County Regional Wastewater Authority (SCRWA), the City of Gilroy, and the City of Morgan Hill. SCRWA produces the recycled water, SCVWD distributes the recycled water, and the cities are the retailers (though recycled water is currently only distributed in the Gilroy area). SCRWA has the capacity to produce 9 million gallons per day (MGD) of tertiary treated water. The existing recycled water distribution system consists of about 8 miles of 12-inch pipeline, about 1 mile of 20-inch pipeline, 3 MGD of distribution pumping capacity, 4.5 million gallons of storage. In addition, SCVWD can use SCRWA's South Pipeline to distribute recycled water south of the SCRWA facility. Recycled water use totaled 2,039 acre-feet (AF) in 2013 (2013 Recycled Water Use).

SCVWD is in the process of completing design and construction of the short-term improvements identified in the 2004 South County Recycled Water Master Plan, including approximately 16,000 feet of 16-inch diameter pipeline, approximately 24,000 feet of 30-inch diameter pipeline, 3 million gallons of additional recycled water storage capacity, and 6 MGD of additional distribution pumping capacity. The short-term improvements also include additional turnouts and customer connections.

This project will construct three new turnouts to meet a combined recycled water demand of 520 AFY. The three turnouts will provide irrigation supplies for a vegetable grower, a nursery, and a seed company. These turnouts will be located on private lands (Obata/Bonfante/Kapa) and easements will need to be acquired. The combined irrigation demand is 520 AFY. The locations of the turnouts and the existing recycled water system are illustrated in the attached project map. The turnouts will be constructed in early 2015.

The project will immediately alleviate drought impacts for these users. By increasing recycled water use, the project will offset potable water use by an equivalent amount, resulting in 520 AFY of in-lieu groundwater recharge. This additional recharge will help maintain groundwater levels for both drinking water and agricultural purposes and avoid groundwater overdraft. Maintaining groundwater levels may also help maintain baseflows in gaining reaches of creeks.

Benefits to Water Quality: This project will reduce nitrate loading to groundwater as a result of customers switching from groundwater with a concentration of about 28 mg/L (Draft Llagas Subbasin Salt and Nutrient Management Plan, page 39) to recycled water with a concentration of 3.1 mg/L (Draft Llagas Subbasin Salt and Nutrient Management Plan, page 40).

Need for expedited funding: Expedited funding for the project is needed to accelerate installation of the turnouts and increase the use of recycled water, as part of SCVWD's drought response strategy (2014 Drought Response Strategy, page 3).

Project Physical Benefits: South County Recycled Water Improvements (SCVWD)

The Primary Physical Benefit of the project is the delivery of 520 AFY of recycled water to agricultural water users and offset groundwater use. The Secondary Physical Benefit of the project is the reduced nitrate loading to groundwater as a result of water users switching from groundwater with a concentration of about 28 mg/L to recycled water with a concentration of 3.1 mg/L. The annual physical benefits are presented in the tables below and documented in the following sections.

Annual Project Physical Benefits - Primary Benefits Project Name: South County Recycled Water Improvements Primary Type of Benefit Claimed: Water Supply Units of the Benefit Claimed : 520 acre-feet per year water supply Additional Information About this Benefit: This is the amount of recycled water demand associated with the new turnouts			
(a)	(b)	(c)	(d)
	Primary Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2014	0	0	0
2015-2064	0	520	520
Comments: Personal communication with potential customers. See "Turnout Summary.xlsx"			

Annual Project Physical Benefits - Secondary Benefits Project Name: South County Recycled Water Improvements Secondary Type of Benefit Claimed: Reduced nitrate loading to groundwater Units of the Benefit Claimed : Pounds per year of nitrate Additional Information About this Benefit: Recycled water is lower in nitrate than groundwater, so irrigation with recycled water will reduce nitrate loading to groundwater.			
(a)	(b)	(c)	(d)
	Secondary Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2014	13,858	13,858	0
2015 - 2064	13,858	1,534	12,324

Comments: Reference: Draft Llagas Subbasin Salt and Nutrient Management Plan, page 33 for irrigation attenuation and pages 39-40 for nitrate concentrations in groundwater and recycled water.

520 AFY is the amount of irrigation with recycled water with the project (Turnout Summary.xlsx).

The attenuation factor for nitrate in irrigation water is 65 percent (Draft Llagas Subbasin Salt and Nutrient Management Plan, page 33).

Nitrate concentrations in groundwater in the project area are 28 mg/L (Draft Llagas Subbasin Salt and Nutrient Management Plan, page 39).

Nitrate concentrations in recycled water are 3.1 mg/L (Draft Llagas Subbasin Salt and Nutrient Management Plan).

Background and Technical Basis for the Project: As documented in Attachment 2, Southern Santa Clara County overlies the Llagas Groundwater Subbasin and agriculture accounts for about half of that pumping. Groundwater supplies are maintained through natural groundwater recharge, managed aquifer recharge with local and imported water supplies, and in-lieu recharge from deliveries of surface water supplies for irrigation demands and recycled water use. Given the zero percent allocation for agriculture and a 50 percent allocation for M&I from the CVP, SCVWD has had to cut back managed groundwater recharge operations. Additionally, SCVWD is in the process of discontinuing deliveries to 72 water users that have SCVWD permits for delivery of untreated surface water from raw water pipelines, which includes some agricultural customers. Given the declining groundwater levels and delivered water supplies, an alternative water supply source must be identified to adequately serve the agricultural water users.

As noted in the Project Discussion section, SCRWA has the capacity to produce 9 MGD of tertiary treated water (SCVWD UWMP, Chapter 7, page 7). but has only 3MGD of distribution pumping capacity. Recycled water use of the existing system totaled 2,039 AF in 2013 (2013 Recycled Water Use, Exhibit A). The 2013 South County Recycled Water Pipeline Short-Term Phase 1B Report (Exhibit B) identified the improvements necessary to fully utilize the recycled water supplies. As documented in the 2014 Drought Response Strategy (Exhibit C), SCVWD is accelerating the development and implementation of the recycled water program to achieve the goals below:

- Prepare high-priority recycled water projects (up to 10 MGD) to be shovel-ready within the next 12 months.
- Aggressively pursue regulatory proposals to provide for safe implementation of indirect and direct potable reuse projects.
- Support and pursue legislative proposals to streamline the implementation of recycled projects
- Complete master planning of ALL recycled water efforts.
- Streamline the process for recycled water projects

Consistent with the drought strategy, SCVWD is in the process of completing design and construction of short-term improvements identified in the plan, including additional connecting and distribution pipeline, recycled water storage capacity, distribution pumping capacity, and turnouts and customer connections.

This project, the South County Recycled Water Improvements, includes construction of three recycled water turnouts from existing pipelines. One of the customers (Obata) already receives recycled water from other turnouts along the South County Recycled Water pipelines and is requesting an additional turnout. The other two customers would be new customers. The reported customer demand from the turnouts is 520 AFY. There is sufficient capacity in the system to meet the additional demands from this project.

Estimates of without project conditions: The without project conditions assumes the turnouts are not constructed and customers continue to use 520 AFY of groundwater for their irrigation supply.

Water supply benefits: The project will provide immediate drought relief by providing 520 AFY of a drought tolerant water supply and eliminating pumping from the stressed groundwater basin by an equivalent 520 AFY. This additional recharge will help maintain groundwater levels for both drinking water and agricultural purposes and avoid groundwater overdraft.

The recycled water demands are estimated based on customer input about the amount of their water potable use that can be replaced with recycled water. Without customer input, irrigation demands are estimated based on acreage and plant type. The recycled water costs compare favorably to groundwater costs because the recycled water is delivered at pressure and does not require pumping. The table below shows SCVWD water rates and estimated pumping costs for groundwater (SCVWD FY 2014-2015 Protection and Augmentation of Water Supplies, page v; expert opinion). The lower cost of recycled water provides an incentive to recycled water use over groundwater.

Water Use	FY 2015 Recycled Water Charge ($/AF)	FY 2015 Groundwater Production Charge ($/AF)	Approximate Pumping Cost ($/AF)	Total Groundwater Cost ($/AF)
Municipal and Industrial	$299.00	$319.00	$50.00	$369.00
Agriculture	$42.94	$19.14	$50.00	$69.14

Monitoring the 520 AFY water supply benefit: The project's 520 AFY of recycled water supply will be measured through water use data collected by SCRWA and reported to SCVWD. SCRWA measures recycled water use at turnouts using meters. The data is reported to SCVWD, who conducts billing.

Water quality benefit: This project will reduce nitrate loading to groundwater as a result of customers switching from groundwater with a concentration of about 28 mg/L (Draft Llagas Subbasin Salt and Nutrient Management Plan, page 39) (Exhibit D) to recycled water with a concentration of 3.1 mg/L (Draft Llagas Subbasin Salt and Nutrient Management Plan, page 40).

Nitrate concentrations in the Llagas groundwater subbasin are elevated above natural levels as a result of historic anthropogenic sources, including fertilizer use, septic systems, and animal waste (Draft Llagas Subbasin Salt and Nutrient Management Plan, page 18). The wastewater treatment process at the SCRWA treatment facility includes a denitrification process to reduce nitrate loading to groundwater (Draft Llagas Subbasin Salt and Nutrient Management Plan, page 43), which reduces nitrate concentrations in the recycled water. Approximately 50% of nitrate in irrigation water is taken up by plants and another 15% is lost due to volatilization and denitrification (Draft Llagas Subbasin Salt and Nutrient Management Plan, page 33). Consequently, 35% of the nitrate in irrigation water is transported to groundwater. As a result, the project will reduce nitrate loading to groundwater by 12,324 pounds per year.

Water Source	Concentration of Nitrate (as nitrate), mg/L	Annual Irrigation Amount (AF)	Pounds per year (Concentration x Volume)	Percent Transported to Groundwater	Total Loading to Groundwater (Pounds per year)
Groundwater	28.0	520	39,594	35	13,858
Recycled Water	3.1	520	4,383	35	1,534
				Nitrate Loading Reduction	12,324

Monitoring water quality benefits: SCRWA monitors the quality of recycled water on a monthly basis and SCVWD monitors groundwater quality on an annual basis. In addition, SCVWD is also conducting a semi-annual groundwater monitoring program as part of implementation of the South County Recycled Water Short-Term Phase I improvements (South Santa Clara County Recycled Water/Groundwater Monitoring Plan, Exhibit E). This program includes monitoring groundwater quality in three areas of the Llagas Subbasin, including the area around the SCRWA facility (page 10 of the monitoring plan). The purpose of this monitoring progam is to characterize groundwater quality near recycled water irrigation sites and provide information to assess changes in groundwater quality over time at sites in the Llagas Subbasin where recycled water is used for irrigation (page 3 of the monitoring plan).

Facilities, policies, and actions required to obtain the physical benefits: This project includes the construction of three new recycled water turnouts. All three turnouts will be constructed in the same manner. The contractor will pothole and hot tap into an existing recycled water pipeline; furnish and install the pipes, fittings, valves and pipe supports for a four to eight inch irrigation service; install a meter; and install bollards to protect the turnout. The three turnouts will provide irrigation supplies for a vegetable grower, a nursery, and a seed company. These turnouts will be located along existing recycled water distribution pipelines as illustrated in the project map. Prior to constructing the turnouts, the District will need to obtain easements for all three

turnouts (Obata/Bonfante/Kapa) and user agreements for all three turnouts. In addition, operators at the Bonfante and Kapa sites will need to undergo recycled water user training before they start using recycled water at their facilities. Obata has already received the training. The turnouts will be constructed in early 2015 and have an expected lifecycle of 50 years.

Potential adverse physical effects: Minor short-term adverse effects may be associated with construction of the turnouts, but it is anticipated these will be insignificant or mitigated to an insignificant level based experience with similar projects.

Cost Effective Analysis

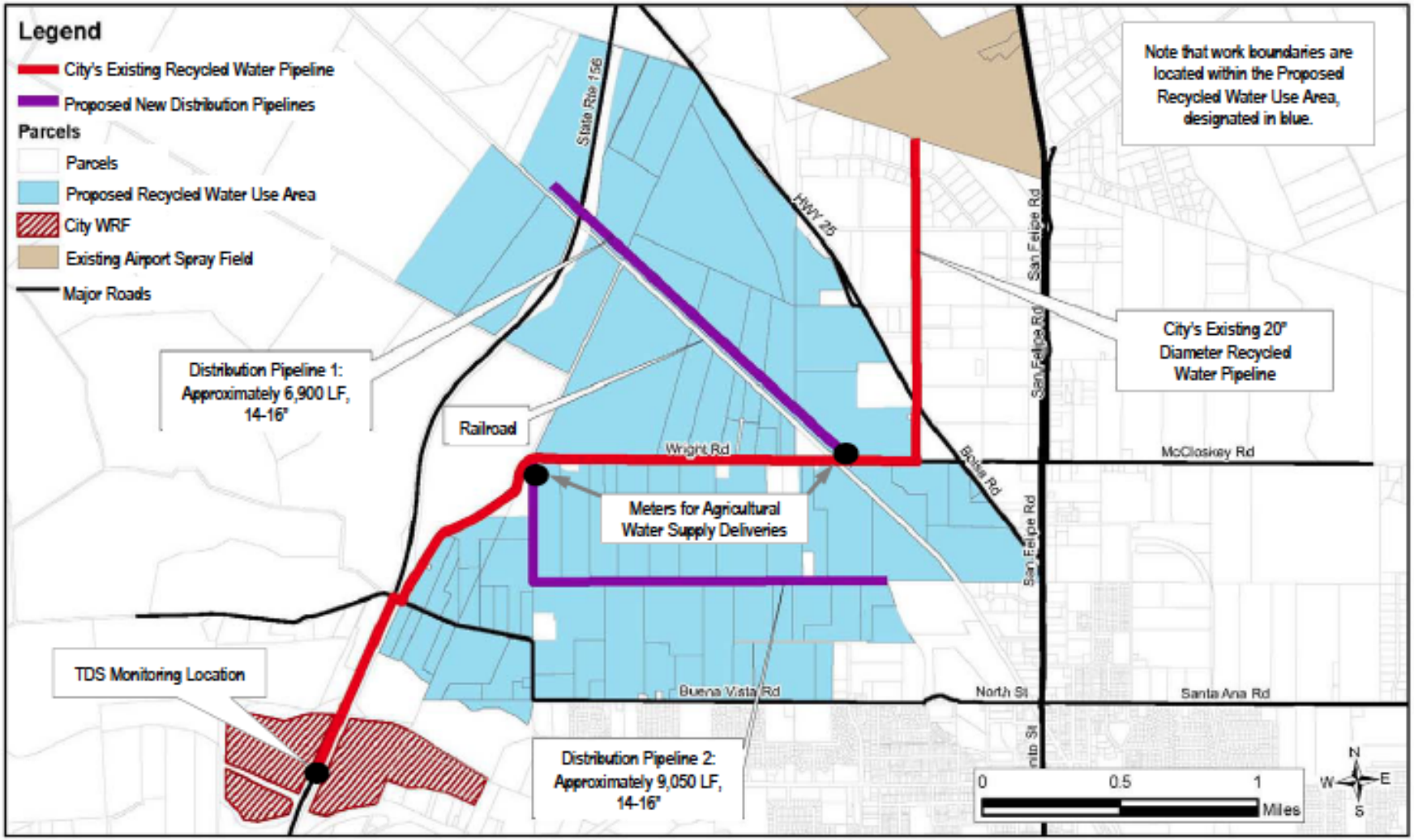
The South County Recycled Water Improvement project is the least cost alternative as described below.

Project Analysis **Project Name:** South County Recycled Water Improvement		
Question 1	Types of benefits provided as shown in Table 5	Recycled water production; Reduced nitrate loading to groundwater
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified?	Yes
	If no, why?	
	If yes, list the methods (including the proposed project) and estimated costs.	The South County Recycled Water Master Plan evaluated how to increase recycled water use in the Llagas Subbasin. The Master Plan recommended three phases of capital improvements – immediate, short-term, and long-term. SCVWD and SCRWA have constructed the immediate term improvement and are in the process of constructing the short-term improvements. All three phases of improvements include increasing distribution system capacity and new customer connections (turnouts) (SCRW MP Appendix D, pages 3, 5, and 7). The proposed project is consistent with the master plan. The SCVWD Water Supply and Infrastructure Master Plan evaluated alternatives for increasing water supply reliability, especially during droughts. The water supply strategy in the master plan includes increasing non-potable recycled water use (WSIMP, p.17 – 18) and assumes the recycled water master plan short-term improvements are completed. The only alternative for increasing recycled water production would be potable reuse. The cost range for potable reuse was higher ($450 - $750/AF) than non-potable reuse ($150 - $550/AF) (WSIMP Update Dec 11, Attachment 2, Page 10). In addition, the costs for potable reuse did not include brine disposal, which would add to the costs for potable reuse. SCVWD and SCRWA's operator CH2M Hill-OMI obtained quotes for the construction of the turnouts in April and January of 2014, respectively. The costs ranged from $33,953 without a meter to $37,300 with a meter (Turnout Figure and Cost). SCVWD obtained a quote for a meter of $1,389.58 in June 2014 (SCVWD Meter Quote). SCVWD is using an estimated cost of $35,000 for construction of one turnout, or $105,000 for construction of the three turnouts.

		The alternative to installing turnouts on existing recycled water pipelines is constructing new recycled water pipelines and customer connections. The estimated construction costs for the planned "Cintas" line being constructed as part of the short-term South County Recycled Water Master Plan is $927,580 (SCRW Phase 1 Planning Study 2013, Appendix C or page 42 of 47 in the pdf). SCVWD has considered alternative methods of reducing nitrate concentrations in groundwater. The Draft Llagas Subbasin Salt and Nutrient Management Plan identifies increased recycled water use as a means of reducing nitrate loading to groundwater (p I-16). Other options that have been considered include increased groundwater recharge with high quality water, agricultural management measures, and wellhead treatment. The Regional Water Quality Control Board is regulating agricultural management measures. SCVWD is implementing increased groundwater recharge through the Main and Madrone Pipelines Project at a cost of $16 million (SCVWD 2015 CIP, page II-29 and 30). Wellhead treatment costs for nitrate removal are on the order of $375 per million gallons (http://www.cdfa.ca.gov/is/ffldrs/about_fertilizer.html) or about $122/AF. The annual cost of treating 520 AF of groundwater would be about $63,000. The annualized cost of turnouts is about $3,000.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.	The proposed project is the lowest cost alternative for achieving the physical benefits.

Project No. 3 Expanded Recycled Water Project

Project Description: This project will deliver recycled water for agricultural irrigation of up to 2,000 acres through approximately 13,000 linear feet of new pipelines and associated appurtenances.



Project Discussion: Expanded Recycled Water Use Project (SBCWD) (1 page maximum)
Eligible Drought Project Type: Provide immediate regional drought preparedness

Project Need: The 2014 Drought has heavily impacted San Benito County, particularly the agricultural community and its supporting industries. These impacts are expected to worsen if the drought continues into 2015. SBCWD has a contract entitlement for 35,550 AFY of imported CVP water for agricultural use and is heavily dependent on the imported surface water to provide a high quality supply for the agricultural users in the valley. During the 10-year period between 2003 and 2013, the average CVP use was approximately 18,032 AFY, while the average groundwater use was approximately 23,060[1]. The SBCWD received a 0 percent allocation for agricultural CVP water in 2014. Although the SBCWD has some limited carryover surface water storage in San Luis Reservoir and San Justo Reservoir coming in to 2014, that amounted to only about 9,000 ac-ft, or less than half what might be supplied during a typical year. As a result, the SBCWD is not able to meet its existing agricultural water demands for 2014.

The consequences of the limited agricultural supply are multiple. The SBCWD estimates that approximately 7,500 to 10,000 acres of land will be fallowed during 2014 or irrigated with lower quality groundwater, which has high levels of total dissolved solids (TDS) and boron. Using the lower quality groundwater with high TDS and boron concentrations can result in salt buildup in the soil, lower crop yields, damage to permanent crops (e.g., stone fruit trees), and ultimately limits farmers to growing lower value crops that can handle higher salt loads.

In addition to not meeting the agricultural demand, the reduction in imported surface water and heavier reliance on groundwater will result in a net overdraft for 2014 and even worse in 2015 if the drought continues. The SBCWD's 2013 Annual Groundwater Report found that groundwater levels were 10-20 lower in some areas of the basin in October 2013 than they were in October 2012 due increased groundwater pumping and widespread declines in groundwater elevation. It is notable that in 2012, approximately 19,855 ac-ft of groundwater was pumped and used in the basin and that increased to over 31,000 ac-ft in 2013. Based on the 0 percent allocation of imported CVP water and limited carryover storage, the anticipated demand for groundwater pumping is expected to be even higher in 2014, resulting in a continued reduction in the groundwater elevation.

Alleviating drought impacts and increasing drought preparedness: In 2012, the City's water reclamation facility produced an average of 1.85 MGD of recycled water. Of the recycled water produced, approximately 460 AFY was used for irrigation of 45 acres at the City's Riverside Park and 90 acres at the spray field. The unused recycled water is currently discharged to percolation ponds, which are uncovered and unlined allowing for evaporation and percolation.

To determine the availability of recycled water to serve additional customers in the Wright Road / Buena Vista service area, a supply/demand analysis was conducted, as described in the *Phase I Recycled Water Facilities Project Components Technical Memorandum*, June 2014. The analysis included a water balance that considered the available recycled water supply over the course of a calendar year compared to the potential demand created by agricultural users in the use area. It was determined that approximately 700 AFY of recycled water could be available immediately based on current inflows to the City's water reclamation facility. The available supply could grow up to 1,230 AFY by 2025, based on the assumption that wastewater flows will increase by approximately 4 percent annually.

The pipelines and associated appurtenances included in this project are sized to accommodate an average annual supply of 2,450 AFY. This larger volume of annual supply could be made available sooner if SBCWD implements a related project to line the existing seasonal storage reservoir; otherwise, the supply would grow over time as the City's population grows and influent flows to the water reclamation facility increase.

Need for expedited funding:
Expedited funding is needed for this project because the drought has significantly impacted SBCWD's revenue from sales of imported agricultural supplies. The reduction in revenue has been estimated to be between $2.6 million to $3.4 million in 2014, resulting in budgetary shortfalls for the district. As a result, SBCWD does not have the available capital to fund the project at this time; thus the available supply being created at the City's WRF, would continue to go unused.

[1] Annual Groundwater Management Plan, Todd Engineers, 12/10/2013.

Project Physical Benefits: Expanded Recycled Water Use Project (SBCWD)

The Primary Physical Benefit of the project is the delivery of up to 2,290 AFY of recycled water to agricultural water users and the offset of an equivalent amount of groundwater usage. The Secondary Physical Benefit of the project is the reduced TDS levels in the water supply. The annual physical benefits are presented in the tables below and documented in the following sections.

Annual Project Physical Benefits - Primary Benefits

Project Name: SBCWD Expanded Recycled Water Use Project
Primary Type of Benefit Claimed: Water Supply
Units of the Benefit Claimed : AFY water supply
Additional Information About this Benefit: The water provided by this project would otherwise be disposed of for non-beneficial use. Growth in supply assumes an average annual growth rate of 4% per year, up to 2,290 AFY.

(a)	(b)	(c)	(d)
	Primary Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2014	0	0	0
2015	0	700	700
2016	0	753	753
2017	0	806	806
2018	0	859	859
2019	0	912	912
2020	0	965	965
2021	0	1018	1018
2022	0	1071	1071
2023	0	1124	1124
2024	0	1177	1177
2025	0	1230	1230
2026	0	1283	1283
2027	0	1336	1336
2028	0	1389	1389
2029	0	1442	1442
2030	0	1495	1495
2031	0	1548	1548
2032	0	1601	1601
2033	0	1654	1654
2034	0	1707	1707
2035	0	1760	1760
2036	0	1813	1813
2037	0	1866	1866
2038	0	1919	1919
2039	0	1972	1972
2040	0	2025	2025
2041	0	2078	2078
2042	0	2131	2131

2043	0	2184	2184
2044	0	2237	2237
2045	0	2290	2290

Comments: Without this project, tertiary treated water produced at the City's water reclamation facility will continue to be disposed of through percolation ponds and/or disposal sprayfields. The project infrastructure is sized, based on peak month demands (i.e., July), to accommodate up to an average annual supply of approximately 2,450 AFY. This strategy would allow capacity for a separate, near-term project to line the seasonal storage reservoir, or for the longer-term growth in recycled water supply, without seasonal storage, based on population growth in the City of Hollister.

Annual Project Physical Benefits - Secondary Benefits

Project Name: SBCWD Expanded Recycled Water Use Project
Secondary Type of Benefit Claimed: Improved quality of agricultural water supply
Units of the Benefit Claimed : mg/L total dissolved solids (TDS)
Additional Information About this Benefit: This benefit represents the comparison of the existing groundwater quality to the better recycled water quality.

(a)	(b)	(c)	(d)
	Secondary Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2014	1200	1200	0
2015	1200	1090	110
2016	1200	1090	110
2017-2045	1200	795	405

Comments: Improved water quality begins immediately following project implementation in 2015. Although the recycled quality for 2017 - 2045 is shown as 795 mg/L TDS. It is expected that this value will improve (i.e., decrease) over time to as low as 500 mg/L, as the water quality of the potable water system is improved as a result of future projects. For the purposes of this analysis, the further reduction from 795 to 500 mg/L has not been included because the future projects are not yet funded and their timing is uncertain. Thus, the benefits shown, or expected to be "worse case" if no additional improvements are made in the potable system.

Background and Technical Basis for the Project: SBCWD's recycled water project has been evaluated in several studies, and has evolved over time. The key studies which form the basis of the project include the following:

1. 2003 Groundwater Management Plan Update for the San Benito County portion of the Gilroy-Hollister Groundwater Basin. Identified the use of recycled water as one aspect of achieving the goal of maintaining and enhancing the agricultural and economic productivity of San Benito County in an environmentally responsible manner (Page 4-13 of the Hollister Urban Area Water and Wastewater Master Plan, 2008).
2. 2005 City of Hollister Long-term Wastewater Management Plan. This report describes a plan for reliably treating and disposing of the City of Hollister's domestic and industrial wastewater. This plan was a precursor to the City's Master Reclamation Permit (R3-2008-0069), described the treatment processes and effluent disposal at the City's Water Reclamation Facility (Page 4-14 of the Hollister Urban Area Water and Wastewater Master Plan, 2008).
3. 2005 San Benito County Regional Recycled Water Project Feasibility Study Report. This early evaluation of the recycled water project had identified agricultural reuse as the most cost effective reuse strategy for the recycled water produced at Water Reclamation Facility. However, another use

area to the west of the of the City's Water Reclamation Facility was recommended at this early stage (Page 4-15 of the Hollister Urban Area Water and Wastewater Master Plan, 2007).

4. 2008 Hollister Urban Area Water and Wastewater Master Plan. This plan included an update of the 2005 Recycled Water Feasibility Study, and identified the Wright Road / McCloskey Road corridor as the preferred location for long term use of agricultural recycled water use in San Benito County, anticipating up to 4,200 AFY could be used in the area (page 4-18 and Appendix I). The Recycled Water Feasibility Study Update was included as an Appendix to the 2008 Master Plan.
5. 2009 Key Issues and Proposed Approach for Recycled Water Program Implementation, Technical Memorandum. This technical memorandum described key issues and strategies for implementing the recycled water project. It identified the beneficial use area along Wright Road, and described the institutional framework needed to implement the program. (Exhibit F)
6. 2012 Recycled Water Use Area Evaluation Technical Memorandum. This technical memorandum described the project recycled water availability and specific use areas were identified and evaluated, including potential project costs and monitoring requirements. This analysis resulted in the recommendation of the Wright Road / Buena Vista Road Use Area as the preferred location for the beneficial agricultural use project. (Exhibit G)
7. 2014 Phase I Recycled Water Facilities Project Components Technical Memorandum. This technical memorandum defines the project components required to serve the Wright Road / Buena Vista service area. (Exhibit H)

The expanded recycled water project will provide new infrastructure to facilitate the expanded, beneficial use of recycled water that would otherwise be disposed of in percolation ponds and/or sprayfields. Although this source of water supply currently exists, it is not being beneficially used due to infrastructure limitations. The new pipelines and appurtenances proposed under this project will facilitate delivery of this supply and, in doing so, will augment the existing agricultural water supply immediately, reducing the effects of future drought conditions. It is projected that the available supply could grow from 700 AFY upon project inception (2015) up to 2,290 AFY in 2045.

This project will also help reduce future groundwater basin overdraft. As described in Attachment 2, the reduction in imported surface water created a heavier reliance on groundwater. As a result, there will be a net overdraft in 2014 from the Gilroy-Hollister groundwater basin, because many farmers who are typically reliant on imported surface water are now forced to pump water groundwater to meet their agricultural demands. If drought conditions continue, this overdraft is expected to continue, unmitigated. The expanded recycled water project will help to offset the overdraft.

Recycled water is considered to be a highly reliable source of supply because its availability is driven by the demand for indoor, potable water supply, which is typically inelastic due to the minimum levels required for human health. As a result, the expanded recycled water project will improve the overall reliability of the local water supply in the Hollister area.

Acceptance of and conversion to recycled water is anticipated by agricultural customers in the Wright Road / Buena Vista service area because many of the parcels in that area only have access to poor quality groundwater as a source of irrigation supply. The groundwater in that area is known to have very high TDS levels, typically greater than 1,200 mg/L (City of Hollister Well #1 Analytical Lab Analysis, January 2011) and there are also concerns about the concentration of boron in the groundwater in that area (measured at 1.1 mg/L in City Well #1 in January 2011), which can be problematic for certain orchard crops commonly grown in the region. A report produced by the Food and Agricultural Organization (FAO), indicates that while 0.2 mg/L boron in water is essential for plant growth, levels of 1 – 2 mg/L may be toxic, particularly for the orchard crops and strawberries typically grown in the use area (Water Quality for Agriculture, Chapter 4, Ayers, 1994, http://www.fao.org/docrep/003/t0234e/t0234e05.htm#TopOfPage).

In 2010, SBCWD implemented a demonstration project, in which typical crops grown in the area were grown using reclaimed water to irrigate a 2.5-acre plot. Both the experimental plot and a control plot included a standard 60-inch raised bed for peppers and tomatoes, and a 40-inch wide raised bed for lettuce and beans. Conventional spray irrigation was utilized to judge salinity (measured as TDS) effects of recycled water on crops. The demonstration project illustrated that the crops grown with recycled water were as good, or better than those grown with local groundwater.

In addition to the positive results of the demonstration project, the salinity of the recycled water will be further reduced with implementation of two projects to improve water quality for the City's potable supply (upgrade of the Lessalt Water Treatment Plant and construction of a new water treatment plant), which will utilize imported surface water, which has a lower total dissolved solids (TDS) concentration than the existing groundwater supply.

Estimates of without project conditions: Without the project, over 2,000 AFY of recycled water will continue to be discharged to percolation ponds, which are uncovered and unlined allowing for evaporation and percolation and agricultural irrigators will continue to rely upon the high TDS water from the overdrafted groundwater basin.

Water supply benefits: In 2012, the City's water reclamation facility produced an average of 1.85 million gallons per day (mgd) of recycled water. Of the recycled water produced, approximately 460 AFY was used for irrigation of 45 acres at the City's Riverside Park and 90 acres at the spray field. The unused recycled water is currently discharged to percolation ponds, which are uncovered and unlined allowing for evaporation and percolation.

As described in the *Phase I Recycled Water Facilities Project Components Technical Memorandum*, June 2014 (Exhibit H), the supply/demand anaylsis for the Wright Road/Buena Vista service area demonstrated that approximately 700 AFY of recycled water could be available immediately based on current inflows to the City's water reclamation facility. The available supply could grow up to 2,290 AFY by 2045, based on the assumption that wastewater flows will increase by approximately 4 percent annually. The pipelines and associated appurtenances included in this project are sized to accommodate increasing supply.

Monitoring the water supply benefit: As described above, the physical benefits of the project include a new source of reliable water supply for agricultural irrigation for agricultural users in the Buena Vista area. The new source of water supply will be measured using flow meters. The flow meters will be located at the turnouts from the City's existing 20-inch diameter pipeline to the new pipelines on the north and south side of Wright Road, respectively. The meters will be read monthly to quantify the amount of recycled water delivered for agricultural users.

Water quality benefit: As described above, the existing groundwater in the use area has a TDS of approximately 1,200 mg/L or greater. The existing reclaimed water currently has a TDS of approximately 1,090 mg/L and it is projected that the TDS concentration will decrease to 795 mg/L following the implementation of the upgrade of the Lessalt Water Treatment Plant and construction of a new water treatment plant. Future improvements to continue improving the potable water system supply should see further reductions in TDS concentrations, but these have not been quantified at this time. The improved water quality should allow for new crop types to be grown in the use area and/or improve the yield of existing crops, and enhance the associated economic value of those crops.

Monitoring water quality benefits: As described above, the physical benefits of this project include a better water quality (measured as TDS) for the agricultural irrigators in the Buena Vista area in comparison to the groundwater they currently rely upon. The water quality will be measured weekly during the irrigation season. Grab samples will be taken at the recycled water pump station located at the City's water reclamation facility to quantify the TDS concentration.

Facilities, policies, and actions required to obtain the physical benefits: The service area for SBCWD's proposed project is to be located along an existing 20-inch recycled water transmission pipeline corridor, which extends from the City of Hollister's water reclamation facility to a spray field disposal site located at the City's airport. Two lateral service lines would be constructed, within the Wright Road/Buena Vista service area, to extend service to parcels both northerly and southerly, as indicated in purple. Pipeline 1 would be a 12- to 16-inch diameter pipeline, extending northwest approximately 6,900 feet from Wright Road, paralleling the railroad, within an existing right of way for SBCWD's imported surface water supply distribution system. Pipeline 2 would also be a 12- to 16-inch diameter pipeline, extending south from Wright Road approximately 3,000 feet, then turning west between parcels, extending approximately 6,050 feet.

The proposed pipeline extensions and laterals would be designed within existing public right of way and along private roadways, providing turnouts for service in central locations where growers can connect their individual

irrigation systems. The service area is approximately 2,000 acres. The project is at 50 percent design as shown in the plan sheet at the end of this project discussion.

In addition to the two pipelines described above, the project will include service connections for agricultural users and meters to measure the water supplied.

An institutional agreement between the City and SBCWD will also be required. The City already has a master reclamation permit (R3-2008-0069) which identifies the City as both the supplier and the distributor of recycled water created at the City's water reclamation facility. The supplier requirements include water supply monitoring, influent monitoring, effluent monitoring, waste disposal and storage facility monitoring, and solids/biosolids monitoring. The distributor requirements include recycled water use area monitoring and associated groundwater monitoring. Since SBCWD will be the purveyor of recycled water for the proposed project, a formal agreement between the City and SBCWD will be required to designate SBCWD as the supplier for the proposed project and identify the terms and conditions as well as the roles and responsibilities between the two agencies.

In addition to the agreement, the City will need to submit an amendment to it's Title 22 Engineer's Report to gain approval from the Regional Water Quality Control Board for the new use site under its existing permit.

Cost Effective Analysis

The SBCWD Expanded Recycled Water Use Project is the least cost alternative as described below.

<table>
<tr><th colspan="2">Project Analysis

Project Name: SBCWD Expanded Recycled Water Use Project</th></tr>
<tr><td>Question 1</td><td>Types of benefits provided as shown in Table 5

1. Increase in agricultural water supply.

2. Improved water quality for agricultural supply.</td></tr>
<tr><td rowspan="3">Question 2</td><td>Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified?

Yes.</td></tr>
<tr><td>If no, why?
N/A</td></tr>
<tr><td>If yes, list the methods (including the proposed project) and estimated costs.

SBCWD has identified other sources of water supply that could be used to enhance the water supply and improve water quality. However, these sources include imported water transfers, which are typically expensive, and the cost is often variable based on the hydrologic year type and associated availability of water from the Sacramento-San Joaquin River Delta.

For 2014, SBCWD has been in negotiations to procure additional agricultural supplies from the Yuba River, north of the Delta. At present, it is anticipated that 1,100 ac-ft could be procured at approximately $1,000 per ac-ft. No additional infrastructure would be required with this alternative. The estimated cost represents the purchase price of the water supply itself. The water would be conveyed and delivered using SBCWD's existing CVP system.</td></tr>
</table>

Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. The proposed project is the least cost alternative and it provides the highest reliability for the community and reduced reliance on imported surface water from the Delta.
Comments:	

1. ALL CONSTRUCTION MUST BE TO SAN BENITO COUNTY STANDARDS UNLESS INDICATED AS CALIFORNIA STATE DEPARTMENT OF TRANSPORTATION STANDARDS (LATEST ISSUE) JULY, 2006
2. SAW CUT ALL TRENCHES IN EXISTING PAVEMENT.
3. CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO ACTUAL CONSTRUCTION.
4. IN THE DRIVEWAY AND PARKING AREAS COMPACT UPPER 12" OF SUBGRADE MATERIAL TO 95% MINIMUM RELATIVE DENSITY UNDER A.C. PAVEMENT, CURB, GUTTER AND DRIVEWAY. FOLLOW RECOMMENDATIONS OF THE SOILS ENGINEERING REPORT BY EARTH SYSTEMS PACIFIC, FILE NO. SH-140XX-SA
5. CONTRACTOR SHALL FIELD REVIEW SITE PRIOR TO SUBMITTING HIS BID.
6. WATER FOR DUST CONTROL AND USE FOR COMPACTION MAY BE PURCHASED FROM THE APPROPRIATE AGENCY PRIOR TO START OF ANY WORK, AND IT IS THE RESPONSIBILITY OF THE CONTRACTOR FOR ANY FEES OF DEPOSITS.
7. AREAS THAT WILL REQUIRE FILL SHALL BE STRIPPED OF ORGANIC MATERIAL. ALL STRIPPINGS SHALL BE STOCKPILED FOR SUBSEQUENT USE IN LANDSCAPING.
8. COMPACT AGGREGATE BASE MATERIAL TO 95% MINIMUM RELATIVE COMPACTION.
9. CONTRACTOR IS RESPONSIBLE TO MAKE ALL ARRANGEMENTS FOR SITE INSPECTIONS AND INSURE THAT ALL CURRENT STANDARDS FOR THE COUNTY OF SAN BENITO ARE FOLLOWED PRIOR TO BEGINNING ANY PHASE OF CONSTRUCTION WORK.
10. SAND BACKFILL ALL TRENCH EXCAVATION IN OR WITHIN 5' OF EXISTING OR FUTURE PAVEMENT.
11. CONTRACTOR SHALL FURNISH TO THE COUNTY CERTIFICATES OF COMPLIANCE FOR CLASS 2 A.B. AND FOR ALL P.C.C. PRIOR TO PAVING ROADWAYS.
12. FOG SEAL ALL ASPHALT CONCRETE SURFACES AFTER ALL MONUMENTS ARE SET, AND THE MANHOLES AND WATER VALVE BOXES ARE RAISED TO GRADE. FOG SEAL MAY BE WAIVED BY THE PUBLIC WORKS INSPECTOR UPON REVIEW OF THE FINISHED SURFACE.
13. CURE COMPOUND IS REQUIRED ON ALL P.C.C. SURFACES.
14. THE CONTRACTOR IS RESPONSIBLE FOR ANY PERMITS AND ANY ASSOCIATED FEES.
15. 48 HOURS NOTICE REQUIRED ON ALL STAKING.
16. AT ANYTIME IN THE PREPARATION FOR OR PROCESS OF EXCAVATION OR OTHERWISE DISTURBING THE GROUND, DISCOVERS ANY HUMAN REMAINS OF ANY AGE, OR ANY SIGNIFICANT ARTIFACT OR OTHER EVIDENCE OF AN ARCHEOLOGICAL SITE SHALL:
    a. CEASE AND DESIST FROM FURTHER EXCAVATION AND DISTURBANCES WITHIN TWO HUNDRED FEET OF THE DISCOVERY OR IN ANY NEARBY AREA REASONABLY SUSPECTED TO OVERLIE ADJACENT REMAINS.
    b. ARRANGE FOR STAKING COMPLETELY AROUND THE AREA OF DISCOVERY BY VISIBLE STAKES NO MORE THAN TEN FEET APART, FORMING A CIRCLE HAVING A RADIUS OF NO LESS THAN ONE HUNDRED FEET FROM THE POINT OF DISCOVERY: PROVIDED, HOWEVER, THAT SUCH STAKING NEED NOT TAKE PLACE ON ADJOINING PROPERTY UNLESS THE OWNER OF THE ADJOINING PROPERTY AUTHORIZES SUCH STAKING. SAID STAKING SHALL NOT INCLUDE FLAGS OR OTHER DEVICES WHICH ATTRACT VANDALS.
    c. NOTIFY THE SHERIFF-CORONER OF THE DISCOVERY IF HUMAN AND-OR QUESTIONABLE REMAINS HAVE BEEN DISCOVERED. THE PLANNING DEPARTMENT DIRECTOR SHALL ALSO BE NOTIFIED.
    d. SUBJECT TO THE LEGAL PROCESS, GRANT ALL DULY AUTHORIZED REPRESENTATIVES OF THE CORONER AND THE PLANNING DEPARTMENT DIRECTOR PERMISSION TO ENTER ONTO THE PROPERTY AND TO TAKE ALL ACTIONS CONSISTENT WITH CHAPTER 5B OF THE SAN BENITO COUNTY CODE AND CONSISTENT WITH SECTION 7050.5 OF THE HUMAN SAFETY CODE AND CHAPTER 10 (COMMENCING WITH SECTION 27460) OF PART 3 OF DIVISION 2 OF TITLE 3 OF THE GOVERNMENT CODE.
17. IN KEEPING WITH THE OBJECTIVES OF THE CENTRAL COAST AIR QUALITY CONTROL DISTRICT, IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO EMPLOY ADEQUATE DUST AND EXHAUST FUMES EMISSIONS CONTROLS DURING ALL PHASES OF PROJECT CONSTRUCTION. SUCH MEASURED SHALL INCLUDE, BUT ARE NOT LIMITED TO, PERIODIC WATERING IF AREAS BEING GRADED. PAVING OF GRADED AREAS AS SOON AS POSSIBLE, PLANTING OF DISTURBED AREAS AS SOON AS POSSIBLE, AND MAINTENANCE OF EMISSIONS CONTROL EQUIPMENT ON ALL CONSTRUCTION TRUCKS.
18. AS REQUIRED BY COUNTY ORDINANCE #667, CONSTRUCTION ON THE PARCELS SHALL BE LIMITED TO THE HOURS OF 7:00 A.M. TO 7:00 P.M., MONDAY THROUGH SATURDAY. NO SUBDIVISION CONSTRUCTION ACTIVITIES SHALL BE ALLOWED ON SUNDAYS AND HOLIDAYS.
19. SUBDIVISION ON-SITE GRADING AND DRAINAGE SHALL BE INSPECTED DURING CONSTRUCTION BY THE COUNTY ENGINEER.
20. THE COUNTY OF SAN BENITO SHALL BE GIVEN ADVANCE 3 WORKING DAYS NOTICE OF INITIAL CONSTRUCTION START-UP AND 48-HOUR NOTICE OF SPECIALTY INSPECTION REQUIREMENTS NEEDED DURING THE PROJECT; ROUTINE INSPECTIONS SHALL REQUIRE 24-HOUR NOTICE.
21. THE WATER DISTRICT WILL ENSURE THAT THE PROVISIONS OF THE APPROVED PLANS AND SPECIFICATIONS ARE COMPLIED WITH, ESPECIALLY WITH REGARD TO THE QUALITY OF WORKMANSHIP AND MATERIALS. IN THE EVENT OF ANY DISCREPANCY OR MATTER OF JUDGMENT, THE DECISION OF THE ENGINEER OR THEIR AUTHORIZED REPRESENTATIVE WILL BE BINDING ON THE CONTRACTOR, DESIGN ENGINEER.
22. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH ACCEPTED WORKMANSHIP PRACTICE AND THESE IMPROVEMENT STANDARDS. ANY WORK NOT ACCEPTED BY THE COUNTY SHALL BE REDONE UNTIL COMPLIANCE WITH THESE IMPROVEMENT STANDARDS IS ACHIEVED, ORDERS GIVEN BY THE COUNTY RELATING TO QUALITY OF MATERIALS AND WORKMANSHIP SHALL BE COMPLIED WITH PROMPTLY BY THE CONTRACTOR.
23. ALL MATERIALS USED SHALL BE SUBJECT TO THE INSPECTION AND APPROVAL OF THE DEPARTMENT AT ALL TIMES, AND SHALL NOT BE USED BEFORE BEING INSPECTED AND APPROVED BY THE INSPECTOR. THE DEPARTMENT HAS THE RIGHT TO PERFORM ANY TESTING DEEMED NECESSARY TO ENSURE COMPLIANCE OF THE MATERIALS WITH THE MATERIALS SPECIFICATIONS. FAILURE OR NEGLECT ON THE PART OF THE DEPARTMENT TO CONDEMN OR REJECT WORK OR MATERIALS NOT IN ACCORDANCE WITH THE MATERIALS SPECIFICATIONS, SHALL NOT BE CONSTRUED TO IMPLY THEIR ACCEPTANCE SHOULD THEIR INFERIORITY BECOME EVIDENT AT ANY TIME. MATERIALS REJECTED BY THE COUNTY SHALL BE IMMEDIATELY REMOVED FROM THE JOB SITE.
24. CONTRACTOR SHALL BE IN POSSESSION OF PLANS APPROVED BE THE COUNTY ENGINEER PRIOR TO CONSTRUCTION.
25. CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES INVOLVED IN THE DEVELOPMENT PRIOR TO BEGINNING OF WORK.
26. CONTRACTOR SHALL NOTIFY "UNDERGROUND SERVICE ALERT" (PHONE 800-642-2444) 48 HOURS IN ADVANCE BEFORE ANY DIGGING.
27. CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING MONUMENTS AND SHALL NOTIFY COUNTY ENGINEER OF ANY DAMAGED OR REMOVED COUNTY, STATE OR BUREAU MONUMENTS.
28. CONTRACTOR SHALL NOTIFY "UTILITY DISTRICT" UPON APPLICATION FOR PERMIT AND PAYMENT OF REQUIRED FEES FOR UTILITY CONNECTIONS.
29. THE CONTRACTOR TO PROVIDE TRAFFIC CONTROL PER STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION TRAFFIC MANUAL FOR CONSTRUCTION WORK.
30. CONTRACTOR TO HYDRO-SEED ALL EXPOSED AREAS WITHIN THE CONSTRUCTION LIMITS.
31. ANY PORTION OF THE EXISTING ROAD DAMAGED THROUGH CONSTRUCTION RELATED ACTIVITIES NEEDS TO BE REPAIRED TO THE SATISFACTION OF THE COUNTY ENGINEER PRIOR TO COMPLETION OF THESE IMPROVEMENTS.
32. THE CONTRACTOR SHALL REQUIRE WATER TRUCKS TO OPERATE IN CONJUNCTION WITH GRADING EQUIPMENT AND APPLICATION OF WATER SHALL BE MADE AS FREQUENTLY AS IS NECESSARY TO CONTROL DUST AT A MINIMUM OF THREE TIMES A DAY. IF DUST IS NOT ADEQUATELY CONTROLLED THROUGH THE APPLICATION OF WATER, GRADING ACTIVITIES WILL BE SUSPENDED AND AN HOURLY WATERING SCHEDULE AND/OR MAXIMUM LIMIT ON THE DAILY NUMBER OF CUBIC YARDS TO BE GRADED WILL BE IMPOSED PRIOR TO THE RESUMPTION OF GRADING. SWEEP STREETS DAILY WITH WATER SWEEPERS.
33. SITE GRADING AND/OR IMPROVEMENT ACTIVITIES SHALL BE PROHIBITED DURING PERIODS WHEN WINDS ARE OVER 15 MILES PER HOUR.
34. ALL TRUCKS HAULING DIRT, SAND OR LOOSE MATERIALS TO BE COVERED.
35. ALL DIESEL OR GASOLINE POWERED MACHINERY NOT IN ACTUAL USE MUST TURN OF ENGINES WHEN IDLE. IN ORDER TO REDUCE ACROLEIN ADMISSIONS THE APPLICANT SHALL BE REQUIRED TO USE DIESEL POWERED MACHINERY THAT WAS PRODUCED AFTER THE YEAR 2003 OR EQUIP THE DIESEL MACHINERY WITH AIR RESOURCE BOARD APPROVED CATALYSIS DIESEL PARTICULATE FILTERS OR DIESEL ORIENTATED CATALYSIS FILTER. THE APPLICANT MAY ALSO OPT TO USE BIO-DIESEL FUELS B99 OR B100 AS AN ALTERNATIVE TO THE FILTER.

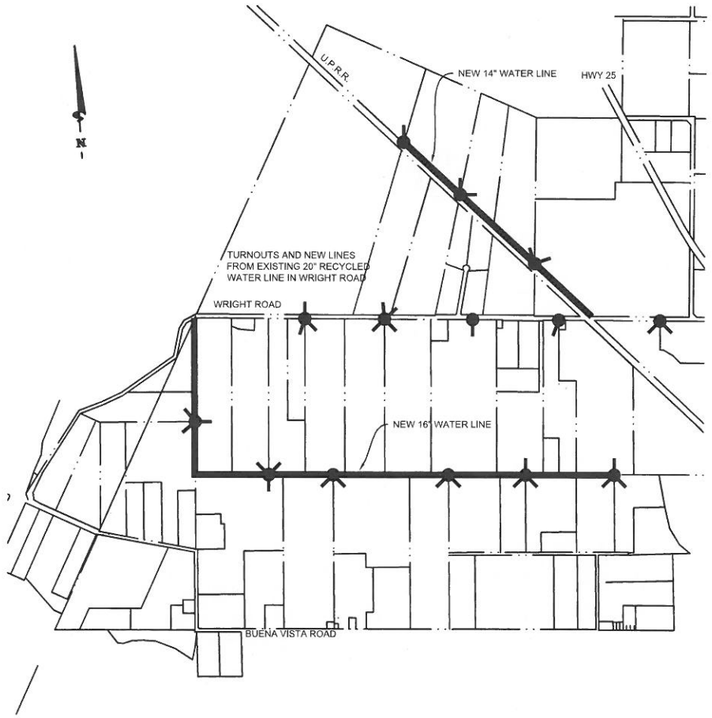
IMPROVEMENT PLANS

for

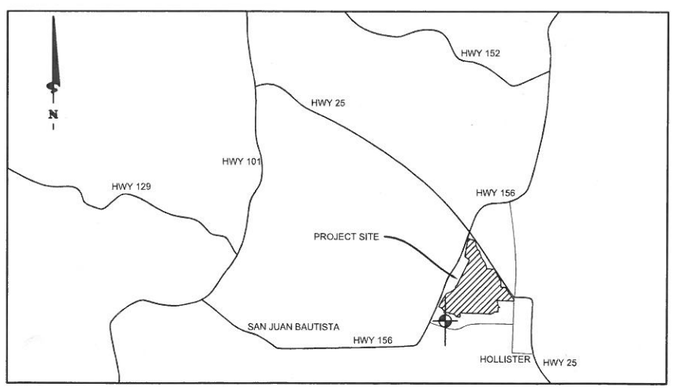
RECYCLED WATER LINE PROJECT PHASE 1

SAN BENITO COUNTY WATER DISTRICT

SAN BENITO COUNTY
JUNE 2014



TURNOUT WITH ONE DELIVERY



BENCHMARK CITY OF HOLLISTER #27 ELEV= 253.823
2 ½" BRASS DISC, STAMPED "CITY OF HOLLISTER BENCH MARK NO. 27", SET AT THE TOP OF A 10'x10'x3' HIGH CONCRETE EASEMENT FOR A GATE VALVE, LOCATED APPROXIMATELY 100' NORTHWEST OF THE DOMESTIC TREATMENT PLANT STATION

UNAUTHORIZED CHANGES & USES: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS ON THE JOB, AND SHALL NOTIFY SAN BENITO ENGINEERING & SURVEYING, INC. OF ANY VARIATIONS FROM THE DIMENSIONS AND CONDITIONS SHOWN. WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALED DIMENSIONS. CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTING SHOP DRAWINGS BEFORE PROCEEDING WITH FABRICATION.

SWPPP NOTE:

PRIOR TO START OF CONSTRUCTION ACTIVITIES, A SWPPP PREPARED BY A CERTIFIED QSP/QSD SHALL BE SUBMITTED TO THE STATE WATER QUALITY CONTROL BOARD, A QSD/QSP SHALL BE RETAINED FOR THE DURATION OF THE CONSTRUCTION AND SHALL BE RESPONSIBLE TO COORDINATE AND COMPLY WITH REQUIREMENTS OF THE REGIONAL WATER QUALITY CONTROL BOARD, TO FILE A NOTICE OF INTENT PER CONSTRUCTION GENERAL PERMIT ORDER NO. 2009-0009-DWQ (AMENDED BY 2010-0014-DWQ) AND TO MONITOR THE PROJECT AREA AS TO COMPLIANCE WITH THE REQUIREMENTS UNTIL ITS COMPLETION.

SAN BENITO COUNTY WATER DISTRICT APPROVAL:

SBCWD DATE

SCOPE OF WORK

ITEM	QUANTITY	UNIT
MOBILIZATION, CLEAR & GRUB	1	L.S
CONNECT TO 20" MAIN	7	E.A.
16" WATER LINE	8,600	L.F.
14" WATER LINE	3,870	L.F.
8" DELIVER, TYPE B, COMPLETE	2	E.A.
8" DELIVERY, TYPE C, COMPLETE	28	E.A.
10" DELIVERY, TYPE C, COMPLETE	1	E.A.
8" DELIVERY, TYPE E, COMPLETE	2	E.A.
AIR VALVE INSTALLATION	4	E.A.
PAVEMENT RESTORATION	1,600	S.F.

OWNER:

SAN BENITO COUNTY WATER DISTRICT
30 MANSFIELD RD
HOLLISTER, CA 95023
(P) 831-637-8218
(F) 831-637-7267

CIVIL ENGINEER:

SAN BENITO ENGINEERING& SURVEYING, INC.
502 MONTEREY ST
HOLLISTER, CA 95023
(P) 831-637-2763
(F) 831-637-6835

GEOTECHNICAL ENGINEER:

EARTH SYSTEMS PACIFIC
500 PARK CENTER DRIVE
HOLLISTER, CA 95023
(P) 831-637-2133
(F) 831-637-0510

SHEET INDEX

LEGEND

	EXISTING CONTOUR
	PROPOSED CONTOUR
(G)	EXISTING GAS MAIN
(SD)	EXISTING STORM DRAIN
(T)	EXISTING TELEPHONE
(OH)	EXISTING OVERHEAD UTILITY
(SS)	EXISTING SANITARY SEWER
(W)	EXISTING WATER LINE
W	WATER LINE
RW	RECLAIMED WATER LINE
SD	STORM DRAIN
SS	SANITARY SEWER
JT	JOINT TRENCH
	STORM DRAIN MANHOLE
	SANITARY SEWER MANHOLE
	WATER VALVE
	FIRE HYDRANT
	BOUNDARY
	PROPERTY LINE
	CENTERLINE
	STORM DRAIN - DROP INLET
	WATER METER
	DIRECTION OF SURFACE FLOW
	DIRECTION OF SLOPE
	SURVEY MONUMENT
	TRAFFIC SIGN
	STREET NAME SIGN
	ELECTROLIER
	EXISTING POWER POLE
TBR	TO BE REMOVED
(E)	EXISTING
(P)	PROPOSED
F&I	FURNISH AND INSTALL
SWPPP	STORMWATER POLLUTION PREVENTION PLAN
QSD	QUALIFIED SWPPP DEVELOPER
QSP	QUALIFIED SWPPP PRACTITIONER
ACP	ASBESTOS CONCRETE PIPE

SAN BENITO ENGINEERING & SURVEYING, INC.
502 Monterey Street Hollister, California 95023
(831) 637-2763 FAX (831) 637-6835 email: sbes@garlic.com

PRELIMINARY NOT FOR CONSTRUCTION

NO.	REVISIONS	DATE

COUNTY OF SAN BENITO
SAN BENITO COUNTY WATER DISTRICT
RECYCLED WATER PHASE 1
STATE OF CALIFORNIA

IMPROVEMENT PLAN
IMPROVEMENT PLANS
COVER SHEET

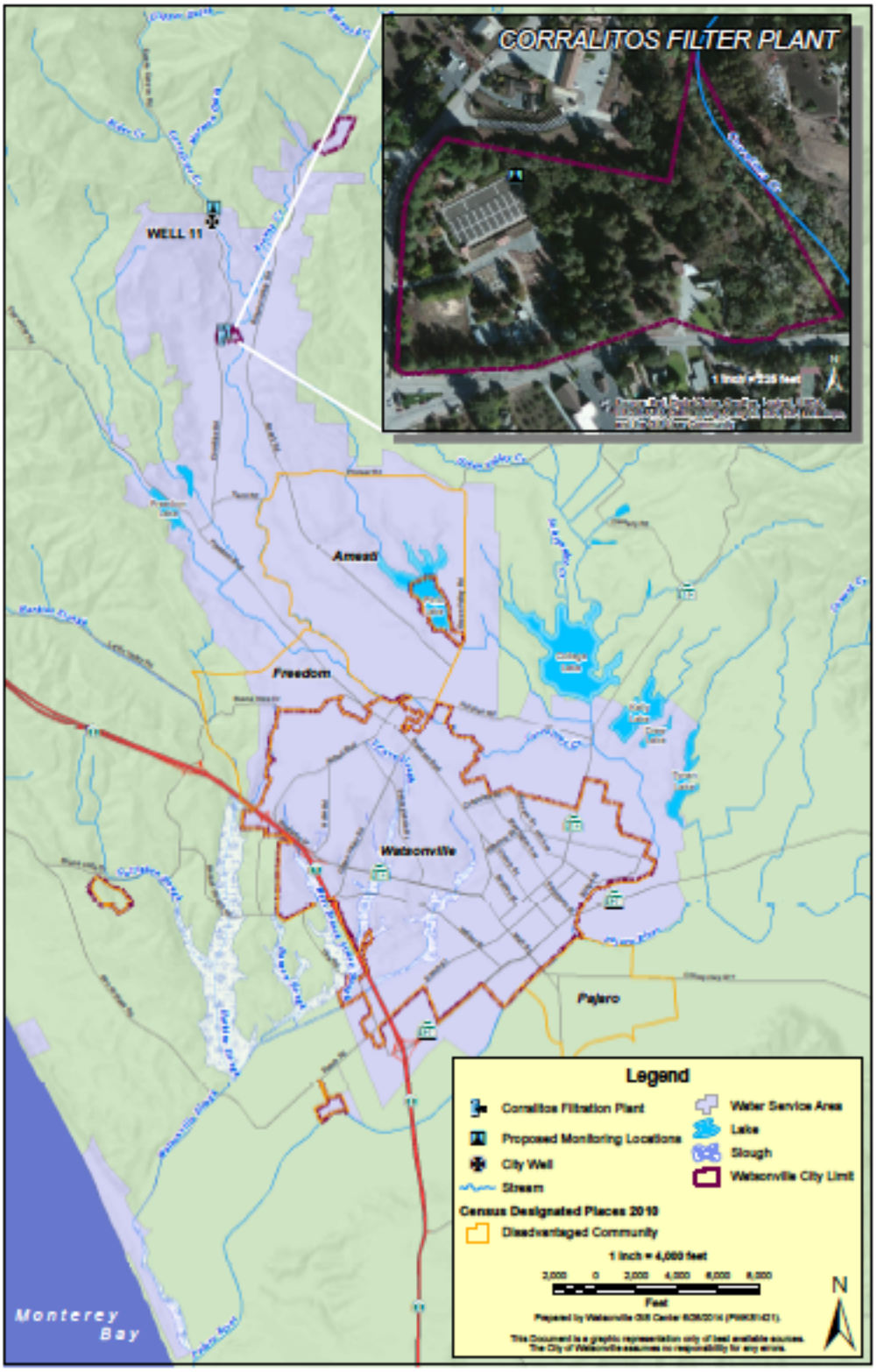
50% REVIEW

SCALE: SCALE AS MARKED
DATE: 08 July 2014
JOB #: 114037
DWG: 114037.dwg
SHEET: 1
OF XX SHEETS

* FILE NAME: C:\Users\Anne\AppData\Local\Temp\AcPublish_3128\114037.dwg * Plotted on: Tuesday, 08 July 2014 at 8:06am by: ANNE *

Project No. 4 Corralitos Creek Water Supply and Fisheries Enhancement

Project Description: The project would upgrade the existing slow sand filter plant to a membrane plant to treat an additional 1,000 AFY to meet drinking water demands.



Project Discussion: Corralitos Creek Water Supply and Fisheries Enhancement (1 page)
Eligible Drought Project Type: Increase local water supply reliability and the delivery of safe drinking water.

Project Need: 95% of the City of Watsonville drinking water supply comes from the Pajaro Valley Groundwater Basin. The Pajaro Valley groundwater basin is in severe overdraft and is experiencing significant seawater intrusion. The basin overdraft has led to competition for the finite groundwater resources, has created conflict between the agricultural and urban water users, and has led to numerous water related lawsuits in the region, forcing the City and the local water agency, PVWMA, to re-evaluate local water supplies and consider the enhancement and expansion of existing local water supplies to offset groundwater pumping.

Compounding the groundwater problem and jeopardizing the drinking water supply for the City is the impact of hexavalent chromium. The City of Watsonville utilizes 12 production wells, all of which are impacted by hexavalent chromium and six of which will exceed the new 10ppb MCL regulatory limit. 50% of the City's water supply will be in violation of the new MCL. Until treatment is implemented, the impacted wells will not meet primary drinking water standards leaving the City vulnerable to drinking water MCL violations.

The remaining 5% of the City's supply comes from the existing Corralitos treatment facility, which is a slow sand filtration plant over 75 years old. Currently, the City can only utilize the plant during summer months when there is good water quality (low turbidity and low suspended solids). Once it rains, the existing plant is shut down due to poor source water quality. Due to the existing treatment limitations, a large percentage of the City's available surface water from Corralitos Creek remains unused.

The hexavalent chromium regulations coupled with the emergency drought leaves the City faced with one of two alternatives: treat for hexavalent chromium or enhance the Corralitos Creek Filter Plant. The City has evaluated the physical benefits of each alternative and developing the Corralitos Creek Filter Plant is the most effective solution. The City will continue to evaluate hexavalent chromium treatment while maximizing efficiency and production from the Corralitos facility.

Delivering safe drinking water: A 2003 pilot study evaluated the effectiveness of membrane treatment technology for increasing and optimizing surface water production from Corralitos Creek. The Corralitos Creek Project would improve the treatment facilities to allow increased diversions during the higher turbidity, winter flows, thereby optimizing and increasing the supplies from the Creek. Corralitos Creek is subject to seasonal fluctuations in water quality. Dry weather flows typically contain turbidity less than 2 nephelometric turbidity units (NTU) and low amounts of total organic carbon (TOC) and color. During the rainy season, storm events result in turbidity spikes over 100 NTU and sustained (longer than one week) turbidity events over 20 NTU. To prevent overloading the slow-sand filtration plant, the City operates the plant during the dry season and discontinues use of the facility when winter rains drives influent turbidity above 10 NTU. Due to existing treatment limitations, a large percentage of the available surface water from Corralitos Creek remains unused. The Corralitos Creek Project would improve the treatment facilities to allow increased diversions during the higher turbidity, winter flows, thereby optimizing and increasing the supplies from the Creek.

The ability of the membrane system to treat high turbidity water during the winter will allow for an additional 1,000 AFY, for a total of 1,400 AFY, of surface water to be delivered to the distribution system in lieu of pumped groundwater. This total represents a 375 percent increase in surface water usage compared to the existing system operation. Additionally, the project would reduce the City's demand on the overdrafted groundwater basin. Without the project, the City will need to rely on the groundwater wells and risk MCL violations.

Need for expedited funding: The City of Watsonville is a Disadvantaged Community, with a Median Household Income less than 80% of the State average and a per capita income of less than 50% of the State average. Developing funding for capital projects in poor communities is extremely challenging. The City already struggles to maintain basic infrastructure, and is now in its fifth year of a 10% employee furlough in order to balance the budget.

The new hexavalent chromium regulation will be implemented July 1, 2014. If the Corralitos project is not implemented, the City is at risk of not delivering a safe drinking water supply. Grant funding is needed to implement the project.

Project Physical Benefits: Corralitos Creek Water Supply and Fisheries Enhancement

The Primary Physical Benefit of the project is the delivery of an additional 1,000 AFY of water from the Corralitos Creek facility. The Secondary Physical Benefit is delivery of a safe drinking water supply in compliance with the new hexavalent chromium MCL limits of 10 ppb. The annual physical benefits are presented in the tables below and documented in the following sections.

Annual Project Physical Benefits - Primary Benefits Project Name: Corralitos Creek Water Supply and Fisheries Enhancement Primary Type of Benefit Claimed: Water Supply Units of the Benefit Claimed : 1,000 acre-feet per year water supply Additional Information About this Benefit: An equivalent amount of water is not pumped, benefiting the overdrafted groundwater basin.			
(a)	(b)	(c)	(d)
	Primary Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2014	400 AFY	400 AFY	0
2015	400 AFY	400 AFY	0
2016-2046	400 AFY	1,400 AFY	1,000
Comments: Project would continue to operate consistent with current operations until improvements are complete and operational in 2016.			

Annual Project Physical Benefits - Secondary Benefits Project Name: Corralitos Creek Water Supply and Fisheries Enhancement Secondary Type of Benefit Claimed: Reduced hexavalent chromium in drinking water Units of the Benefit Claimed: ppb hexavalent chromium Additional Information About this Benefit: The surface water meets the 10 ppb MCL for hexavalent chromium and replaces the contaminated groundwater supply.			
(a)	(b)	(c)	(d)
	Secondary Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (c) – (b)
2014	15 ppb	15 ppb	0 ppb
2015	15 ppb	15 ppb	0 ppb
2016 - 2046	15 ppb	0 ppb	15 ppb
Comments: The average hexavalent chromium level in groundwater is 15 ppb and non-detect in Corralitos Creek. Impacted groundwater will continue to be utilized until the new facilities are operational in 2016.			

Background and Technical Basis for the Project: 5% of the City's current source of supply comes from the existing Corralitos treatment facility. The City's existing Corralitos slow sand filtration plant is over 75 years old. It is composed of a series of sand filters, which are large beds of sand that remove sediment and particles from the water as it slowly seeps through. Slow sand filters are labor-intensive and have to be cleaned periodically by manually shoveling off the top filter layer. To prevent overloading the slow-sand filtration plant, the City operates the plant during the dry season and discontinues use of the facility when winter rains drives influent turbidity above 10 NTU. There are only two of these types of plants left in the state. Most water agencies have modernized to alternative treatment systems and membrane filtration has become one of the

more common treatment technologies in use today. Due to existing treatment limitations, a large percentage of the available surface water from Corralitos Creek remains unused.

Due to treatment limitations, large amounts of surface water are currently passing by the Corralitos Creek plant unutilized and ultimately discharging to the Monterey Bay. This waste of a surface water source gives the City minimal flexibility in managing their supply based on seasonal weather changes and increases their dependence on an overdrafted groundwater basin. An upgraded treatment plant with additional treatment capacity will allow the City the opportunity to optimize the best combination of surface and groundwater, which results in a sustainable water use best practice for the area's aquifer.

A 2009 City study recommended membrane treatment for increasing and optimizing surface water production from Corralitos Creek (TM 6 Membrane Filtration, Exhibit I). Dry weather flows typically contain turbidity less than 2 nephelometric turbidity units (NTU) and low amounts of total organic carbon (TOC) and color. During the rainy season, storm events result in turbidity spikes over 100 NTU and sustained (longer than one week) turbidity events over 20 NTU. Membrane filtration utilizes a special material containing microscopic pores that allows water to pass through but holds back any particulate matter. The pores are so small that even bacteria and viruses are removed. The technology has developed significantly over the last ten years, and it has become known for its reliability and effectiveness as a water treatment system.

A 2009 pilot study confirmed that the project will meet the objective of treating wet weather flow water quality. Pilot testing of membranes was performed on the Watsonville source water from February through June 2009 (Membrane Pilot Study, Exhibit J). The primary objective was to quantify and achieve optimum organics removal across the membrane and then determine how to translate this to a full scale plant design and operating procedures. Additional testing objectives were:

- Determine optimal coagulant dose
- Perform organic stress testing
- Simulate high turbidity events
- Determine optimal cleaning regime
- Determine efficient run parameters
- Perform high flux stress testing

There were two phases of pilot testing. The operating parameters and conditions were as follows.

	Phase I Operation	Phase II Operation
Pretreatment	Flash mix and floc mix, 17 minute contact time	Flash mix only, 3 minute contact time
Normalized Flux	145 gfd	180 gfd
Coagulant and Dose	$FeCl_3$ @ 12 mg/l	ACH @ 10 mg/l
Filtration Cycle Time	90 Minutes	90 Minutes
Chemically Enhanced Backwash (CEB)	Once every 3 days, either sulfuric acid or sodium hypochlorite	Once every 3 days, alternating sulfuric acid (pH 2) and sodium hypochlorite (50ppm free chlorine)
Initial Transmembrane Pressure (TMP)	4.3	4.22-8.34
TMP gain over filtration cycle	Max: 1.4 psi, Min: 0.70 psi, Avg: .99 psi	
Average raw water turbidity	1.5 NTU	2 NTU
Maximum raw water turbidity	3 NTU	33 NTU

While optimizing the ferric chloride dosing and type of CEB regimen for Phase I of testing, two separate extremely high influent turbidity spikes were captured and measured at over 200 NTU. The data from this phase is shown in Figure 11 below.

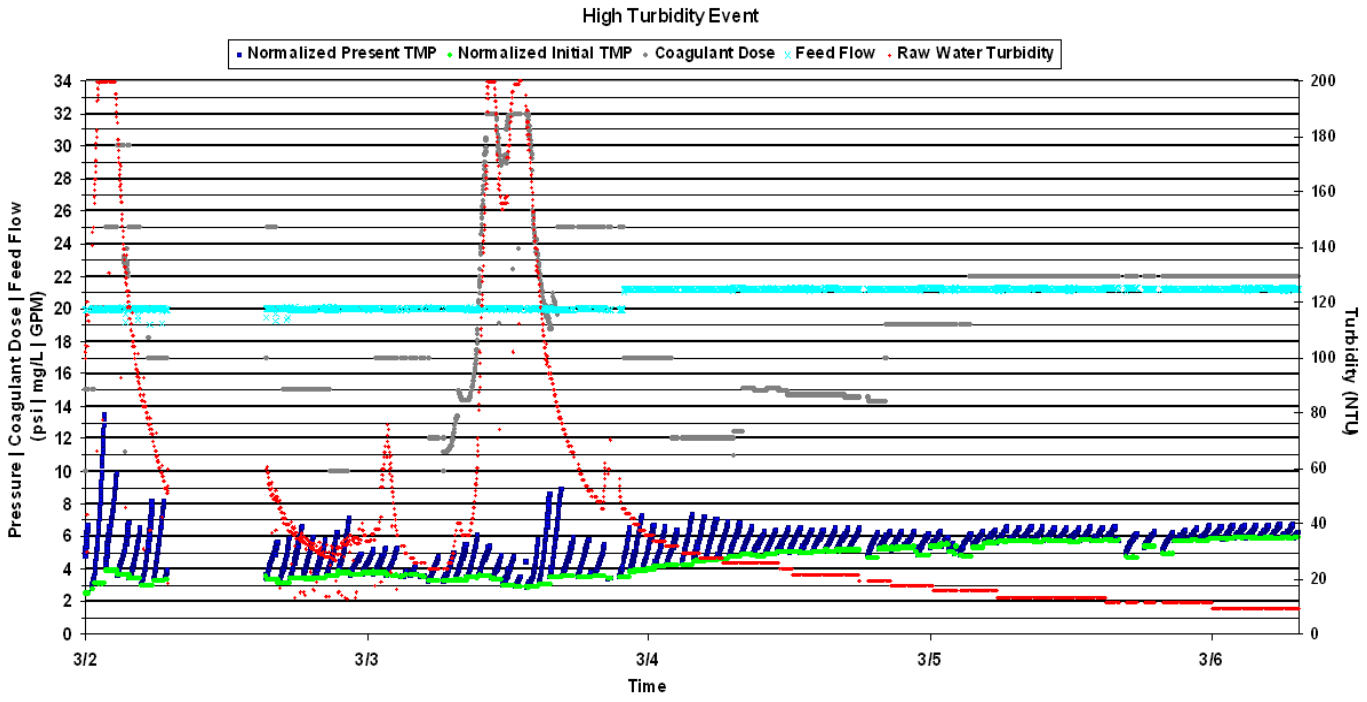


Figure 11. Data Captured During High Turbidity Spikes

During the storm events, the highest dose of FeCl3 needed to maintain low initial TMP's was 30 mg/L total concentration. The ceramic membrane performed well in the high turbidity event with a max TMP of 20.17 and an average TMP of 8.73. Organic concentration in the raw water was higher than the previous year, which is assumed to be due to a forest fire in the area the previous year. Based on UV 254 samples, influent organics remained elevated a day after turbidity settled out of the raw water. Sodium Hypochlorite CEB's were important during this stage to control organic fouling and continue stable membrane performance. Sodium Hypochlorite CEB's were important during this stage of operation to control organic fouling and continue stable membrane performance. Aside from the high turbidity event described above, the typical raw water quality during the optimization period was seasonally representative with the majority of raw water turbidities of less than 2 NTU.

Phase I of Pilot Testing: There were no major interruptions or major fouling of the membrane throughout Phase I. Results showed the unit could handle high turbidity (1.5 - 220 NTU) and high TOC (1 – 14 mg/L) events without loss of capacity and or pre-sedimentation. Periods of heavy rain, high turbidity and variable influent water quality made it difficult to determine the necessary CEB chemical and frequency. The selection of Sodium Hypochlorite for CEB's during Phase I was a result Phase I of the pilot testing included a high flux test for 9 days. The temperature corrected flux was 225 gfd. The $FeCl_3$ dose was tested at 12 mg/L, 15 mg/L, and 17 mg/L to see how the membrane reacted. The initial TMP only increased from 4.5 psi to 5.8 psi over 9 days. CEBs with hypochlorite were performed daily during this time. Figure 12 shows the data recorded during this test.

Phase II of Pilot Testing: The influent water quality during this time period, typical of summer months in Watsonville, was very stable with a low turbidity and organic concentration. The initial TMP at the beginning of this phase was 4.22 psi and the final initial TMP was 8.34 psi. Only after this phase of testing was it evident that the operating parameters selected were not optimal. Several possible factors in the change in initial TMP include: a result of the pre-screen failure, the CEB chemistry and frequency, and the replacement of pilot unit hard drive due to failure. After Phase II of the testing, the 4th and final CIP was conducted. A verification run was performed after this to confirm complete recovery of the membrane.

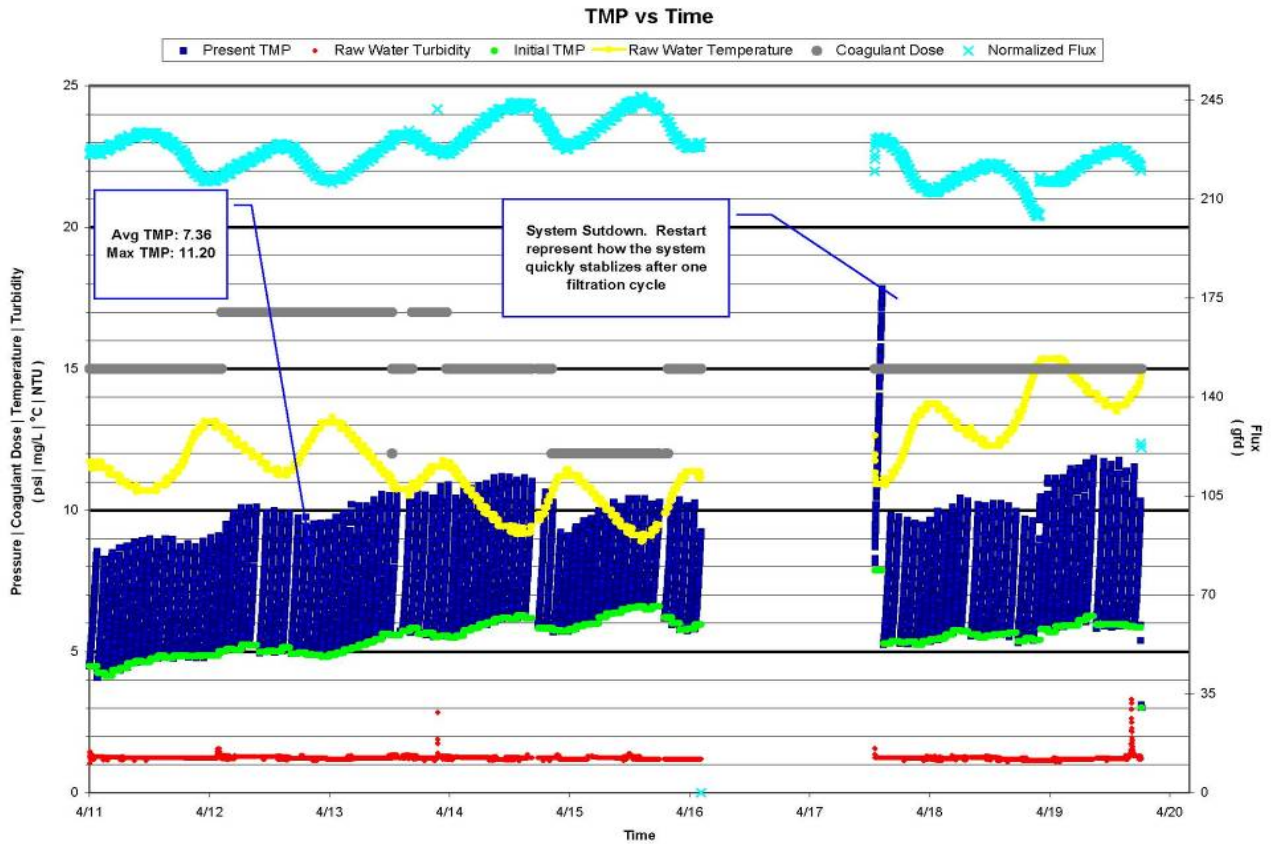


Figure 12. Data from Pilot Test and Stress Testing at 225 gfd

The pilot testing demonstrated that the membranes could reliably treat water with turbidity as high as 200 NTU and total organic carbon (TOC) levels up to 14 mg/L. The membranes were tested at a normalized flux of 145 gallons per square foot per day (gfd). Given these results, the City proceeded with project design of the membrane facility. The process flow schematic is shown in Figure 13.

Estimates of without project conditions: Without the project, the City of Watsonville will continue to rely on an overdrafted groundwater basin. Additionally, after the new hexavalent chromium regulation become effective July 1, 2014, the City will need to rely on the six wells not impacted by hexavalent chromium or be in violation of MCLs if the supply from the wells is inadequate to meet demands.

Water supply benefits: 95% of the City's current source of supply comes from the Pajaro Valley Groundwater Basin and 5% from Corralitos Creek. By improving the treatment technology, the City can treat high turbidity water during the winter. These improvements will yield an additional 1,000 AF, for a total of 1,400 AF, of potable water to be delivered in lieu of pumped groundwater. In turn, the City's reliance of groundwater wells would decrease, allowing in-lieu recharge of the overdrafted groundwater basin.

Based on data from the City of Watsonville Water Division, the City uses approximately 7,300 AFY of groundwater and 400 AFY of surface water from Corralitos Creek, with a total water demand of approximately 7,700 AFY. The 1,000 AFY of additional supply from Corralitos Creek will help offset the loss of groundwater supply from the six wells impacted by hexavalent chromium. Additionally, the project design includes provisions to allow for future expansion to a total capacity of 2,000 AFY.

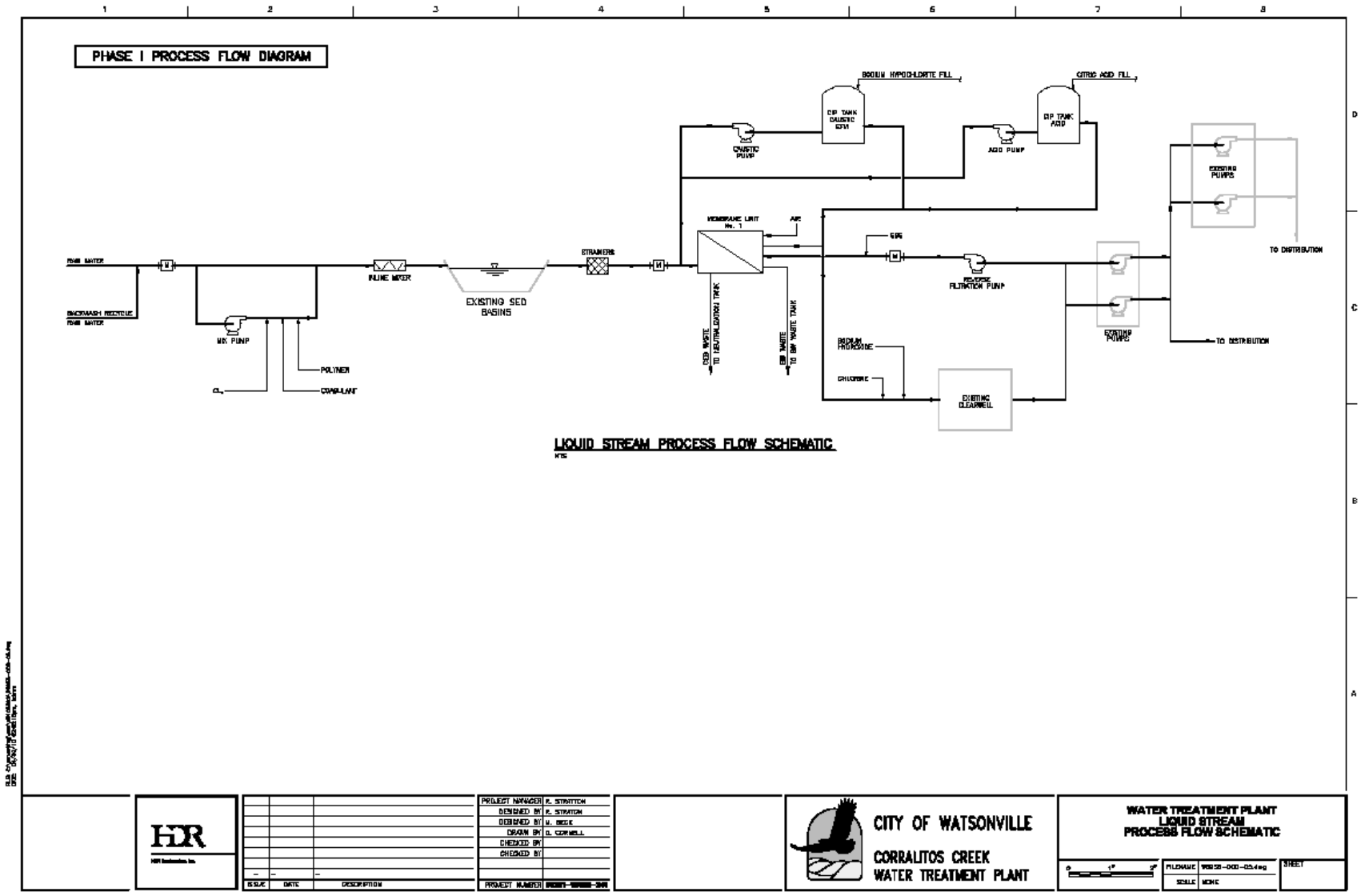


Figure 13. Process Flow Schematic

Monitoring the 1,000 AFY water supply benefit. The project's performance in meeting its water resource goals will be monitored through the program summarized in the table below. Quantity measurements such as total water production are obtained directly from the flow meters at the water treatment plant.

Performance Criteria & Measures	Criteria Met?
1. **The City's surface water capture has increased by 275%,** as measured by annual total flow production (via the treated water flow meter) from the upgraded Corralitos Creek WTP.	
2. **Aquifer drawdown has slowed by 1,000 acre-feet per year**, as measured by totaling the annual groundwater pump production (via the pump station flow meters) from each well.	
3. **Plant demand from Corralitos Creek has decreased during the summer months**, as measured by comparing the seasonal total production in acre-feet after the WTP upgrade with the current seasonal demand.	
4. **Drinking water is meeting all regulatory requirements**, as measured by as measured by water quality testing, which includes: pH, turbidity, odor, color, bacteriological, THM/HAA6, and TOC.	

Water quality benefit: The City of Watsonville utilizes 12 production wells, all of which are impacted by hexavalent chromium and six of which will exceed the new 10ppb MCL (Figure 14). 50% of the City's water supply will be in violation of the new MCL, and will become unavailable once the MCL is implemented. The average hexavalent chromium level is approximately 15 ppb for those wells over MCL. The supply from Corralitos Creek has no detectable level of hexavalent chromium. Therefore, the water supply benefit is a reduced hexavalent chromium level of approximately 15 ppb. Without the project, the City will be violating a primary drinking water standard and incurring any penalties associated with the violation.

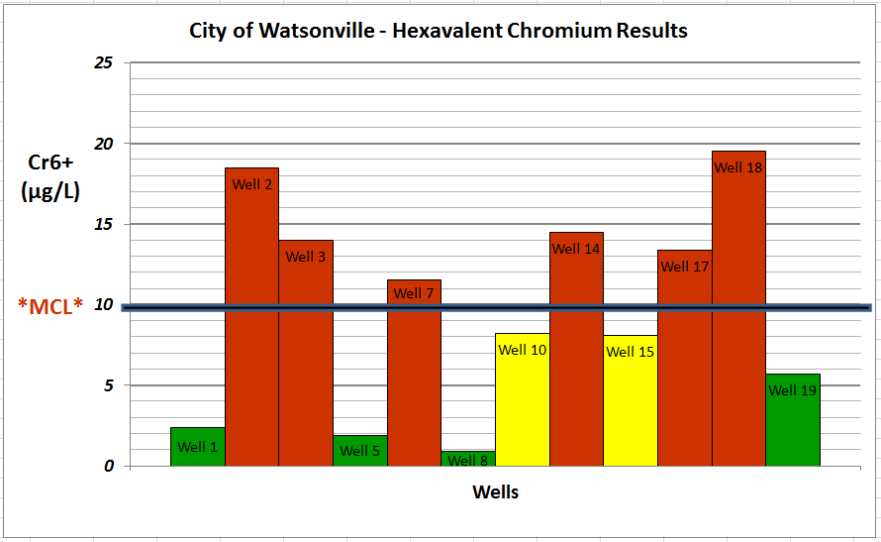


Figure 14. Hexavalant Chromium Levels

While in the long term the City will need to invest in hexavalent chromium treatment, in the near term the City needs to identify a supplemental supply to meet water quality objectives to meet current drinking water demands. The City will continue to work diligently on installing hexavalent chromium treatment at the impacted groundwater well sites.

Monitoring water quality benefits: Water quality measurements will continue on a weekly, monthly and quarterly basis to comply with regulatory requirements. These measurements include: bacteriological, and general physical

components. The general physical components are turbidity (which serves as a proxy for suspended solids), pH, odor and color. The City will continue quarterly THM/HAA6 monitoring. With the new membrane filtration technology, the City will have to monitor TOC throughout the plant.

Facilities, policies, and actions required to obtain the physical benefits: The project includes raw water pipelines that will convey surface water from Corralitos Creek to the water treatment plant flow metering station that will allow for gravity flow into an equalization basin. From the equalization basin, raw water will be pumped through a pretreatment system including strainers, flash mix, and in pipe flocculation. The membrane filtration system includes a clean-in-place (CIP) cleaning system and chemically enhanced backwash cleaning system. Chlorine gas will be used for pre-oxidation and disinfection. The project will use the existing clearwell for contact time and the existing pump station for distribution. In addition to chlorine, chemicals to be added will include alum, ferric chloride, or aluminum chlorohydrate (ACH) as a coagulant to remove organics (if needed), and caustic to increase pH and preserve alkalinity. In 2009, HDR evaluated different types of membrane filtration technology from the 2003 pilot project (Exhibit I). Based on cost and design analysis in 2011 by HDR, the City chose to move forward with Pall membrane filtration technology.

Potential adverse physical effects: With significant input from NOAA Fisheries, the City completed a formal environmental review under the California Environmental Quality Act (CEQA). The environmental review found that the project will not create significant environmental impacts, and it was issued a Negative Declaration. A Notice of Determination is attached in Exhibit K. The only adverse physical effects are considered short term construction related impacts that will be mitigated to less than significant levels.

Cost Effective Analysis

<table>
<tr><td colspan="2">Project Analysis

Project Name: Corralitos Creek Water Supply Project</td></tr>
<tr><td>Question 1</td><td>Water supply and water quality improvements</td></tr>
<tr><td rowspan="3">Question 2</td><td>Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes.</td></tr>
<tr><td>If no, why?</td></tr>
<tr><td>If yes, list the methods (including the proposed project) and estimated costs.
The Project provides water at a cost of $174 per AF over 30 years. The new facility will increase the surface water treatment capacity by 1,027 AFY, from 373 AFY to 1,400 AFY. The planned improvements at the Corralitos Water Treatment Plant are based on a typical life-cycle of thirty (30) years. The total capital cost of the project is $5.3 million as documented in the Budget Proposal Section of this application. The unit cost per AF over the projected life of the project is calculated below.

$$\frac{\$5{,}346{,}003}{(1{,}400 - 373\ AFY)\ x\ 30\ years} = \$174/AF$$
The only other potential potable source of water for the City at this time is desalination of seawater, which is estimated to cost a minimum of $1,500 (including operations costs) per AF, as estimated in the PVWMA 2002 BMP.</td></tr>
</table>

Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. **The proposed project is the most cost-effective solution, as compared to a desalination plant. Treatment of hexavalent chrome in existing wells provides some relief to the community for water supply, but does not provide the benefit of reducing groundwater overdraft or protecting endangered species, and so was not used in the cost-effectiveness analysis.**
Comments: **This project provides long-term on-going benefits to the community, the groundwater basin, and to the local steelhead population.**	